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January, 1907

THE MOUNTAIN GOAT HERD

HE mysteries in the care of wild animals in captivity are numerous and perplexing. By way of illustration, take the White Mountain Goat, (Oreamnos montanus). In August, 1905, we possessed four fine, healthy specimens, and kept them at the old Prong-Horned Antelope House. In September of that year, all of them died. In October, 1905, we acquired five more specimens from the same locality as the original herd, but one year younger. We quartered them in the same spot, in care of the same keeper, who has fed them in precisely the same manner as the preceding bunch, except that their crushed oats have been prepared in the Park and are now known to be pure. The reason why we have made no other

change in the care of the second flock is, that the first was cared for to the best of our ability, and we knew of only one improvement to make.

To-day the second flock of five is intact, and in excellent health and vigor. Its members seem to be as large and as vigorous as wild goats of the same age. They are not kept on Mountain Sheep Hill because for some unknown reason they never have thriven there. By means of some very steep runways of planks, they have been given access to the roof of their rustic barn, and the snow-white flock, walking indifferently over the steep slope, or perching on the comb, is one of the most startling and amusing spectacles in the Park.



HERD OF ROCKY MOUNTAIN COATS.



THE CALIFORNIA CONDOR.

AN ALMOST EXTINCT BIRD.

Special Correspondence of the New York Evening Post.

Washington, November 14.—One of the recent acquisitions at the New York Zoological Park was the subject which attracted the attention and evident interest of the delegates attending the twenty-fourth annual congress of the American Ornithologists' Union at today's session. This was the California condor, "General," one of the five specimens of this almost extinct bird which naturalists have been able to capture and nurture in captivity. The other four condors are in the Government zoological collection in Rock Creek Park here. The rarity of the bird and the fact that the description of it was given by a young man who had spent three entire months in the San Bernardino Mountains in southern California in quest of the nest from which "General" came into the world, caused the audience of several hundred bird lovers to follow closely every point of the description.

The speaker was William L. Finley, of Portland, Ore., who had carried his long search to a successful conclusion, and had then trained the captive. It was on March 10, last, that he found a condor nest in the California mountains, with a single glossy egg and an adult condor sitting close by. For twelve days he and his companion watched the nest. After that time their vigil was rewarded by the discovery that a young condor had been born.

How the two young men made their first investigation was told to the Evening Post's correspondent this afternoon by Mr. Finley. He said:

"A ridge, just wide enough for a path, dropped steep into the gorge on both sides. For two miles we wound around a shaky trail, tracing the top rim of the basin. A great slab of gray stone barred the doorway of the condor's home, and protected it from storms. Up a steep, narrow pocket we scram-

bled, clinging to the scrubby bushes and the snaky roots, washed bare by rain, until we could peer through a crack in the rocks. An uncanny feeling went through me as I made out indistinctly the big black body of the condor, with its orange colored head and beady eyes watching me intently."

As Mr. Finley's object was not merely to capture a specimen for a zoological collection and thus win one of the large rewards offered, but as his stronger wish was to study the habits of the bird in its mountain home, the nest was not then disturbed. Instead, the watchers quietly retired and made periodic trips back to the place. Eight such trips were made between March 10 and July 5. The many observations made during this time yielded much information of great scientific value, and as soon as the news of the discovery became known attracted the attention of Director Hornaday in New York. It was due to the latter's prompt avowal of the importance of this work that the two young men continued their efforts and kept a detailed record of their experiences.

It was in the beginning of July, when the young condor was 110 days old, that Mr. Finley took the bird from its nest and carried it with him to his home in Portland. It weighed then fifteen and one-half pounds. In August, the condor was taken to a summer camp up the

Willamette River, and placed in an enclosure in the forest. For two months the bird was under the closest observation from day to day and was treated to a diet of a pound of raw meat twice a day and plenty of fresh water. Especial attention was given to the bird's feeding in order to determine whether the natural propensity to live on carrion would manifest itself. It was found ultimately that it ate the fresh raw meat by choice and would never touch anything else unless driven to do so by the absence of any other food.

This, however, was but one of the important observations jotted down. How the young condor began to master the use of his wings is best told in Mr. Finley's own words:

"When 'General' was 150 days old he was well fledged, except that his breast was still covered with gray down. His wing feathers were strong, but they were not yet able to sup-port his heavy body. If we did not let him out of his cage a part of each day, he became very restless. When the gate was opened he would stop a moment or two, look about and stalk slowly out. He did nothing without deliberation. Then, with several hops he would go half-way across the yard, clapping his big wings, and going through a regular dance, jumping up in the air several times in succession. On his removal from his wild native haunt he had lost his wildness and had now become gentle and fond of those who cared for him. He loved to be petted and fondled, would nibble at my hand, run his nose up my sleeve, and bite the buttons on my coat. Every move he made was with care, as if afraid of being too rough. If scared or struck at he would strike back, but there was never the least inclination of savageness when well treated.

"One would think there could be little attachment for a vulture, but there is nothing treacherous or savage in the condor nature. Contrary to expectation, he was cleanly in his habits. Becoming accustomed to fresh meat, he would take nothing else, and if it was the least bit dirty he would refuse it; while game, such as squirrel and rabbit, he would not touch if he could get fresh beef. When mixed with squirrel meat, the beef would be eaten and the other left. He would gnaw a good bone with as much eagerness as a dog until there was not a bit of meat left on it."

The ornithologists composing the audience gave frequent evidence of their appreciation of the splendid photographic illustrations of the young condor extending his wings and posing in obedience to his captor's wishes. Scientific men well know the aversion that wild birds and animals have to the camera, and "General" was in the beginning no exception to this rule. Mr. Finley attributed this dislike not only to natural causes, but to the fact that when the young condor was first taken out of his nest in his wild state he had hissed in defiance at being posed before the camera and fought like a demon. After having been in captivity for several months and having received consideration at the hands of his captors his attitude toward them changed, but remained as before toward any stranger coming to the camp.

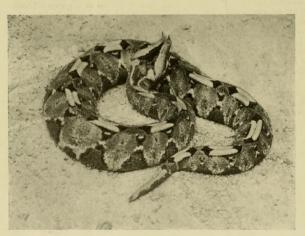
At times the young condor was as playful as a pup, Mr. Finley said, and after having his breakfast, would jump down from his perch and tov with a stick in true canine fashion. shaking it in his bill, and then dropping it only to jump upon it with both feet and toss it up again. He was extremely fond of pulling on a rope, and would strain at the guy lines of the canvas tents in a way that seemed to threaten their demolition. A rope dragged along the ground he would watch and follow like a kitten after a string. He learned to follow his owner about and to come when called. If a ladder was stood up against a tree, he would hop up, rung by rung, to the top, and then fly off, only to repeat the experiment again and again. He liked to be petted and amused, and showed great interest in any sign of activity about the camp.

One of the novel characteristics discovered was the young condor's fondness for bathing. He would go down to the creek near the camp and patter along in the water for an hour at a time. A piece of broken china or a little wad of white paper would attract his eye. He would get under a water spout and wallow in the pool. When thoroughly soaked, he would step out into the sun for a moment and then suddenly go back again. He would keep this up until almost exhausted by the exercise, and would then want to take a sun bath and sprawl in the sand.

From all these observations Mr. Finley has come to the conclusion that there are many good characteristics in this bird, which has always been considered a degenerate and the incarnation of ugliness in the feathered tribe. The bird was not stupid, noticed everything, took human companionship not passively, but with evident appreciation, showed anger only when there was cause, and demonstrated his strong instinct for cleanliness and a diet of good food. Behind his rough exterior and

his appearance of savageness, there were these many good qualities.

When the care of the young condor was relinguished to Director Hornaday in New York the bird weighed twenty and one-half pounds, was forty-six inches in length, and had a wingspread of eight feet. The fact that the bird's history has been followed from the egg stage to the present time has made the present instance unique in the records of wild birds in this country. There are only forty-one condor eggs in the museums of the whole world, and as the species is now so nearly extinct it is not likely that this number will ever be largely increased. It is popularly supposed that the eggs of the great auk are the rarest of their kind, but between seventy and eighty of them have been preserved. None other of the raptorial birds has a range so restricted, and its range at the present time, so far as scientific men know, is from Monterey County, California, southward into Lower California.



THE RHINOCEROS VIPER.

In some other sections the extermination of the species was probably due to the habit of stock raisers in baiting carcasses with poison in order to kill off carnivorous wild animals such as panthers, grizzly bears, and prairie wolves. As the condors, soaring aloft, most easily espied these baits and were sociable in their habit of assembling wherever carrion was to be found, large numbers of them thus fell victims to the trap intended for predatory wild beasts. As all the best authorities on wild bird life assert that the condor lays only one egg in a season, the rate of reproduction is at best very limited and when numbers fell victims to these traps the species was very rapidly thinned out. All these discoveries add interest to the case of the specimen which the New York Zoological Park now possesses and give added importance to the intricate and detailed life record of the bird, as kept by his captors from the time of their discovery of the egg, twelve days before the birth of "General."

THE AFRICAN VIPERS.

F ALL the serpents exhibited in our Reptile House, the most gorgeous in its coloration is the Rhinoceros Viper, (Bitis nasicornis), while the most hideous in configuration is the Gaboon Viper, (Bitis gabonica). Both of these specimens were captured in the Congo Free State, Central Africa, by Mr. S. P.

Verner, of Montgomery, Alabama, who has long been engaged in African explorations, and who brought to America the Pigmy "Ota Benga."

The Rhinoceros Viper is not a large snake. Even when stretched out, it measures only 38 inches, but it is two-and-a-half inches in diameter at the thickest part of the body. The head is rather small for a viperine snake. Though it is provided with two curious horns upon the snout, imparting an eccentric profile. it is the coloration of the reptile that is most striking. To any one who has not seen the specimen, an adequate and truthful description is likely to seem like flowery extravagance in the use of terms.

Owing to the roughly-keeled scales the entire upper surface has a velvety luster. Down the back is a series of large, oblong saddles, of a brilliant blue; and these are set in jet-black rhombs that are bordered with deep crimson. On the sides are large, upright blotches, like inverted V's, which are dark green, bordered first with crimson, and externally with pale blue. The little "ground color" showing be-

tween the blotches is olive, thickly powdered with black, suggesting the richest of dark-

green velvet.

When this specimen arrived at the Park, it was of a dingy gray color, with but the faintest suggestion of a pattern. This was due to its being covered with a very old, begrimed skin. As its eyes were quite lusterless, the writer decided to relieve the snake of its epidermis. Starting the skin backward from the upper and lower jaw with a pair of forceps, the snake did the rest, slowly emerging from its opaque coat. The display of startling colors and striking pattern caused those standing by to fairly gasp in astonishment. The impression upon the writer recalled the transformation of certain insects from a dull-colored grub to a

beautiful imago, and not to him alone occurred this resemblance, for the keepers have since called the creature the "Butterfly Viper."

In the Gaboon Viper we may also note a remarkable pattern suggesting oriental tapestry, but attention is concentrated upon the sinister configuration, showing an incongruously thick, bloated body and the most cruel of heads—heart-shaped, with silvery-white, cat-like eyes that stare in a glassy, unwinking fashion that is ever alert. This snake is barely a yard long, though nearly three inches in thickness. Its head is as large as that of a big rattlesnake. The poison-conducting fangs are enormously developed, and if the fangs were fully imbedded, its bite would be almost inevitably fatal.

R. L. D.



MOVING THE ALLIGATORS TO WINTER QUARTERS.

THE ALLIGATOR PROBLEM.

ASHORT time after the opening of the Reptile House, seven years ago, interested visitors began to bring us small alligators as gifts,—the proverbial ten or twelve inch "barkers" brought from Florida as souvenirs. Kept in an ordinary living-room temperature, in a pan of cold water, young

alligators feed sparingly or not at all, and remain about the same size. In the warm tanks of the Reptile House, this collection of miniature crocodilians began to grow. From a small section of the turtle crawl they were removed to a lobby cage. After a season a panel was drawn and they were allowed the run of two lobby cages. Then they began exhibiting such vigor it was feared they would break the glass,

so they were transferred to the big tank on the main floor of the Reptile House that formerly was occupied by the marine turtles. Here they looked dwarfed in the big basin of deep water, but soon evinced an inclination to increase prodigiously in size. Early last summer, some of the "babies" were large enough to crawl over the side of the tank, which they usually did at night.

Our next resource was the old sea-lion pool, depopulated by the removal of the sea-lions to Baird Court. In this was placed the entire nursery colony, some of them now so heavy it was necessary to tie their jaws together with rope, blindfold them and transport them one at a time, on a wheel-barrow. In that big rock basin the colony thrived and grew.

When our first frosty weather came this fall a most embarrassing situation was presented. What should we do with the "small" alligators? They had outgrown all accommodations. Several of them were nearly seven feet long. There were over thirty in the lot and the big alligator pool contained the giant crocodilians that would murder any but the largest and strongest

We solved the problem temporarily by giving them a mezzanine floor of wire netting in one end of the big pool. A few of the strongest (and best fighters) were placed with the big fellows, where they are holding their own fairly well.

R. L. D.

A NEW PYTHON.

RECENT addition to the collection of reptiles is one of the largest pythons ever exhibited alive in this country. This is a female example of the Regal Python, (Python reticulatus), gorgeous in a rainbow coat of flashing irridescence, at least twentyfour feet long, thirty inches in circumference and weighing exactly two hundred and sixty pounds. This splendid specimen was captured in the jungles of the Malay Peninsula, and obtained at Singapore by Captain Henry Wilkes of the steamship "Indrasamha," who sold it to the Society. We are not positive about the creature's exact length as she is extremely nervous and vicious, and it is not advisable to handle her until she has commenced feeding regularly. Regarding her circumference and weight, we can explain that the former was estimated while the snake was vet in the crate, and the second was obtained by first weighing the crated specimen, and afterward the empty crate itself.

In this serpent we were fortunate in pro-

curing a python freshly captured. While crossing the Atlantic, so Captain Wilkes explains, the snake appeared uneasy, and finally disgorged the thigh bone of an animal of considerable size. After it had been placed in the largest of our Reptile House cages it disgorged a ball of coarse, bristly hair. This, on being examined, was easily identified as the bristles of an Indian wild boar (Sus indicus), and evidently a mature individual. As the Indian wild boar attains a weight of two hundred and sixty pounds, and is a fierce and powerful creature, the struggle between the snake and its formidable prey may be imagined. R. L. D.

A COLLECTION OF TRINIDAD REPTILES.

O MR. R. R. MOLE, of Port-of-Spain, Trinidad, the Society is indebted for many interesting specimens. It is from Mr. Mole we have received all our specimens of that most formidable of all South American poisonous snakes, the Bushmaster, (Lachesis mutus); also the greater number of our Lance-Head Vipers, (Lachesis atrox). Ouite recently, this gentleman sent us two more very interesting shipments of Trinidad reptiles. Among the specimens was an adult female example of the Lance-Head Viper-the Fer-de-Lance of the Creole-French, (Lachesis atrox); a large Rat Snake, (Spilotes variabilis); two species Water Snake, (Liophis cobella and Helicops angulata); a tree snake, (Oxybelis acuminatus), and a curious subterraneous serpent, known technically as Glauconia albifrons, which spends most of its life in ant-hills, where it feeds upon the larvæ of the insects. or upon the soft-bodied "white ants" themselves (the termites). Besides the collection of serpents were several species of lizards. Among these were two strikingly pronounced types of the Family Teiidae—one represented by a series of powerful Tegus, (Tupinambus teguixin), the other by a degenerate, burrowing lizard, (Scolecosaurus cuvieri), which is worm-like, with diminutive legs.

The Tegus are the most vicious lizards that ever have come to the Reptile House. When liberated in the big, sandy yards containing the iguanas and the monitors, they rushed into immediate combat. During the fighting, three large iguanas were killed, and a number of smaller examples had their tails chewed off. It was found necessary to place the Tegus in the pen with the powerful rhinoceros iguanas, where any individual on either side, with hostile inclination, could find a worthy antagonist.

Among evenly-matched cage associates, the Tegus soon evinced a less pugnacious disposition.

R. L. D.

THE END IN SIGHT.

AFTER ten years of diligent effort, two of which were spent in planning and eight in active operations, the end of construction work in the Zoological Park is to-day actually in sight. With the completion of the Elephant House, the Zebra Houses, and the Administration Building, all of which are measurably assured, we may contemplate a Zoological Park which is practically finished. We see no reason why the three structures named above can not be erected and occupied by December 31, 1908. The most important of these structures, the Elephant House, will be under contract within two months, and it should be finished in the spring of 1908.

Of course it is to be understood that in an institution of this kind, an absolute end of all betterments never is found. By "practically finished" we mean—as complete as zoological gardens and parks ever are at any given period. Boundary walls and permanent entrance pavilions are very small matters in comparison with the large undertakings involved in the care and exhibition of animals, and the welfare of

visitors generally.

It is no secret that the Executive Committee is laboring very diligently to reach what we may justly call "the finish." Mr. Barney, Professor Osborn, Mr. Grant, and the other members of the Committee are not willing that the making of the ideal Park should drag on forever, and involve incalculable expense. But the pace set has been very rapid for all concerned, and the resting-place, when reached, will be greatly enjoyed.

THE GUIDE-BOOK.

NDER ordinary conditions, the Official Guide to the Zoological Park would have been revised and brought down to date one year ago. It was deemed advisable, however, to delay this work until the end of the present year, in order to include the last of the installations for animals, and make the volume substantially complete and permanent.

The Director of the Park has now completed this revision and extension, and by April first the new volume will be ready. The future will be anticipated far enough to include the Elephant House and Zebra Houses, chiefly for the reason that half the living creatures necessary to fill them are already in hand, and require notice. The new volume will be much larger than the current edition, its map will be brought down to date, and it will contain many new illustrations; but the price will not be advanced. As usual, all members of the Society will receive the new issue as soon as it can be finished and mailed.

WILD-ANIMAL PROTECTION IN AFRICA.

THE ponderous blue-book of nearly four hundred pages recently published by the British Government on "The Preservation of Wild Animals in Africa" is evidence of the deep and practical interest of Great Britain in that subject. Even a brief inspection of the documents set forth is sufficient to show that already the game situation is well in hand, and that eventually every territory of the British possessions in Africa will have its game laws and game reserves. The measures that already are in force in territories whose names are yet unknown to Americans, are to us both an example and a reproach. In Africa, the white population is organizing to protect its lawful heritage of big game. In Alaska, both whites and natives seem to hate all game laws, and think only of destruction.

DESTRUCTION OF ANIMAL LIFE IN ALASKA.

ALARMING reports have reached the Zoological Society concerning the destruction of moose, caribou, and mountain sheep in Alaska. It appears that hundreds of laborers on the Alaska Central Railway, and in various mining camps, are regularly subsisting upon the finest game animals in North America. The slaughter along the line of the above-mentioned railway is particularly appalling.

It is charged by men who recently have arrived from Alaska that not only is game being slaughtered most ruthlessly, but that heads of moose, sheep, and caribou are being surreptitiously shipped to the United States in large numbers. The situation seems to demand immediate action on the part of those who do not wish to see the large game of Alaska completely exterminated in quick time.

THE ANNUAL MEETING.

The Annual Meeting of the New York Zoological Society will be held in the small ballroom of the Hotel Astor on January 8, 1907.

ZOOLOGICAL SOCIETY BULLETIN

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AS OTHERS SEE US,

In view of the studious manner in which English naturalists are now comparing and criticizing the zoological gardens of Europe, a recent critique on the New York Zoological Park is of special interest. Since the appearance of a noteworthy volume by C. V. A. Peel, entitled "The Zoological Gardens of Europe," and a later survey by Capt. S. S. Flower, director of the Cairo Zoological Garden, some American zoologists have regretted the fact that their vivaria were not being considered and criticized with those of Europe.

Mr. F. G. Aflalo, a very competent critic, recently visited the Zoological Park, and in the London Outlook there has appeared an article by him, which we reproduce entire in this issue. We have no doubt that the members of the Zoological Society will be interested in the opinions of a man who is a critical naturalist, and also a prominent and loyal member of the Zoological Society of London. Mr. Aflalo has written several very interesting books, one of which is entitled "A Walk Through the (London) Zoological Gardens."

THE NEW YORK ZOO.

By F. G. Aflalo, F.Z.S.

From the London OUTLOOK,

OT more than fifteen or twenty miles can lie between Bronx and the Bowery. You cover the distance for a five-cent fare on the up-town subway, which takes you out to the West Farms terminus, as my recollection goes, in less than the hour; but so brief a journey is a link between one of man's most crowded hives and a replica of the wild, with an ibex at gaze on the skyline, a herd of buffalo lying in the snow, a bear playing hide-and-seek behind a boulder. Within the two hundred and fifty acres of land and water comprised in the Bronx Zoological Park the visitor finds at once the expression of American ideals and the reproach of European Zoos.

Perspective, immensity, a middle distance that would measure the furthest limit of Old World menageries, to which it is as New York's flatiron buildings to mud hovels in Connemara; these are the keynote of Bronx. owes its present achievement and its yet greater promise to its freedom from the trammels of tradition and immunity from the handicap of obsolete ideals of architecture, as well as to that liberal policy of progress which is the comfortable equation of public subsidy and private Multi-millionaires among its generosity. founders put their hands in their pockets whenever some unusually expensive alteration is imperative, for New York is a city in which the man who is not in want of it has only to ask for money and it pours into his lap. If Washington had control of such funds, its more beautiful park might prove a dangerous rival, but outside of that continent I doubt if Bronx will ever have its peer. If Mr. Hornaday's life's work is to be eclipsed, it will be by one of his own countrymen.

Granite ridges, scraped bare at their summits by early glacial action, run north and south over most of the area between East 182d Street and Pelham Avenue. It is wild Nature, so cunningly adapted to the semi-artificial requirements of a menagerie that the eye of the casual visitor without any special knowledge of such operations will have some difficulty in discriminating between the original landscape and the work of the Director. As recently as three years ago, for instance, what is now a pond for aquatic mammals was a moving peat-bog, and other bogs have with equal skill been transformed into useful ponds that gleam in setting of gneiss, quartz, and granite. In no orthodox "Zoo" should we look for the wild effect of the forest background, the acres of oak, maple, and cedar that hide the skyline, the sheen of thirty acres of water dotted with wild fowl, some of which, free of the air, fly to and fro and lend yet more natural effect to the scene.

The permanent buildings will in all probability be enlarged until they are stupendous. Nothing less than record houses for the lions, snakes, and monkeys will ultimately satisfy New York, and it is too much to hope that the architectural programme of an institution so richly endowed will escape infection by the skyscraping microbe. Yet the admirers of Bronx will pray that outdoor space may keep first place in its ambitions. It is to the open-air features of this remarkable collection that the visitor from Europe turns with envious eve. Where much is excellent, praise in detail is laborious, but there are notes of individuality that can not be ignored in eulogy of the whole. Right at the entrance a buffalo range, dotted here and there with the shaggy remnants of a herd, strikes the note of the prairies, vastness, desolation, above all a reminder of the extinction of a fine type that Mr. Roosevelt has likened to the destruction of all the works of a classic author. From almost any point of view the huge Flying Cage is sure to catch the curious eye; and this mammoth aviary, with its hundred feet of water, appreciated by the ponderous pelican and rosy flamingo, and its trio of trees for the comfort of smaller perching fowl, is an extraordinary advance on even the flying cages of our own and other gardens. Another ideal of the open life for these honored captives is found in the grassy ranges, a thousand feet of them, partly overgrown with oak and cedar, on which the restless sheep and deer of America and other continents can, after their fashion, wander as they graze. Lastly, the playground of the bears, a group in which America is more blest, or otherwise, than all the rest of the world, affords those massive vet delicate brutes unequaled opportunities of indulging in healthful frolic in the public eye.

The view that the permanent buildings will eventually be permitted to dwarf the open spaces is, it must be admitted, not based on their present dimensions. So far, they are agreeably subordinated to the outdoor accommodation. The lion house, though it will, when completed, have cost no less a sum than £30,000, can not, certainly, be regarded as superior to that at Regent's Park. Indeed, it is questionable whether on the whole it makes even so solid an impression. Its one advance on the lion houses of Europe is the flexible wire netting used in place of rigid bars, with a result at

once pleasing to the eye and comfortable to the captive animals, which are thus unable to injure themselves during the paroxysms of rage that often accompany their arrival in new quarters. An annex of the Bronx lion house in the form of a well-lighted studio, with a special cage to enable painters and sculptors to work from the living model, marks an advance in a different but not less important direction; but this innovation, though welcome on other grounds, does not call for notice in a criticism concerned only with the park as an animal home. If the Bronx lion house is in no way superior to our own, the reptile house is, to my way of thinking, inferior, although in certain accessible groups, notably the rattlesnakes, the collection is more representative, and the Florida alligators grow rapidly as the result of direct sunlight on the tanks. The monkey house is chiefly notable for the open-air system provided, as the result of which it is claimed that death from phthisis, so fatal in the majority of European monkey houses, is all but unknown. Other epidemics at Bronx are infrequent, though a strange and mysterious malady carried off all but one of the Californian sea-lions during a recent mild winter, but did not affect another of the herd that had been sent to the Aquarium, another admirable institution under the control of the same society and most ably conducted by Mr. C. H. Townsend. On first reaching the Aquarium the sealion barked night and day until the Director, after a surfeit of sleepless nights, ordered extra rations of fish until, as he expressively put it, the brute "quit barking or burst." The desired silence followed, but ever since the animal has moved unceasingly around its tank, which the Director attributes to permanently heated blood as the result of its orgy.

The memories of Bronx are of mingled envy and contentment. Animal lovers should be free from small jealousy, and as one who has long taken deep interest in our own Zoological Gardens, I know no rancor over the greater achievements of New York. Nay, if their park is broader, their library is insignificant, and there is not one of their officials who does not speak with reverence of the splendid literature published by the London society. Their own publications, including the guide, which so keen a sportsman as Mr. Hornaday has been able to make more interesting than the majority of such books, and periodical bulletins copiously illustrated with photographs from the camera of Mr. Sanborn, are wholly popular in their conception. The good work in the direction of investigating disease in captive animals which

is being done by the medical staff is not yet available in print, but should one day prove a valuable addition to our knowledge of a study in which our European Zoological staffs have been a little remiss. The literature of such societies is the growth of generations and will doubtless come in good time. Meanwhile the



THE FRIGATE BIRD.

Park, which approaches completion, is already a marvelous achievement; and when Mr. Hornaday rests from his labors, the science of the outdoor menagerie, conducted on lines at once popular and humane, will know no higher expression than it will find in the glades and valleys of the Bronx.

THE FRIGATE BIRDS.

AMONG the rarest and most interesting birds received this year at the Zoological Park are the Frigate Birds, which were collected in Mexico for the Society, and placed on exhibition late in November.

These birds render complete the six families of the order Steganopodes, or aquatic birds with webs connecting all four toes. The other five families, including the tropic birds, gannets, snake birds, cormorants, and pelicans have all been on exhibition in the Park before,

The Frigate Bird, (Fregata aquila, Linn.), is in some ways the most interesting of all its congeners. Structurally, as well as in habits, the Steganopodes are closely related to the

more terrestrial birds of prey, the hawks and eagles, and the Frigate Birds are the nearest to a connecting link between the two great orders,

They are, however, extremely specialized for an aerial life and in comparison with the weight of the body, the spread of wing exceeds

that of any other birds. Frigate Birds inhabit the tropical oceans, and though often keeping near the shore, they are more independent of the land than any other sea bird, except the albatrosses and petrels, They can not dive, and they walk or swim with difficulty, and in accordance with these habits, the feet and legs are small and the webs between the toes very deeply incised. While the tarsus measures less than an inch in length, the spread of wing is sometimes eight feet!

With all these apparent handicaps, their marvelous power of flight ensures prey in abundance. When a school of flying fish breaks from the water, it is often because of some

fierce aquatic pursuer, but if a Frigate Bird is soaring high overhead, a sudden headlong dive and the snap of a hooked beak sends the fluttering little fish back in terror to the water, minus one of their number.

The Frigate Birds, or Man-o'-War Hawks as they are called, also rob gulls and terns of their hard-earned fish. The birds in the Zoological Park are young, and the heads and necks are white. As the birds attain adult plumage this white color is lost, and finally the entire head becomes a glossy black hue. This is the reverse of what takes place in the bald eagles, where the dark immature head plumage is replaced by white in the full-grown birds.

When the young birds at the Park first arrived they were very thin and weak, due to the severe sea-sickness from which they suffered on their journey north. Remarkable though it is, this malady attacks many sea-birds, such as the albatross, when they are carried on the deck of a vessel.

The graceful, long-pointed wings and the deeply forked tail are indicative of the wonderful aerial ability of the Frigate Bird, and

afford characters for easy identification when these birds are seen from a steamer's deck. An impressive sight is when a number of these birds are seen driving ahead of a storm of wind and rain until, becoming tired of sporting with the raging elements, they swiftly rise until they reach calm and sunlight high above the tempest.

Frigate Birds are gregarious, and large numbers build their rough nests of sticks on the low mangrove bushes of some small coral key, or isolated tropical shore. One to three large white eggs are laid, and hatch into fluffy white chicks, which never leave their rough platforms until able to follow their parents on the wing, to begin at once the use of those wonderful pinions which will carry them through their life, thousands upon thousands of miles over stormy seas and calm.

C. W. B.

probability of the discovery in America of any living representative of the genus *Capra*, and that it is useless to pursue the phantom "Ibex" of the West.

The specimen shot in Colorado, and submitted to us, was a domestic goat, presumably of Spanish breed, that had escaped from cap-



ROCKY MOUNTAIN SHEEP HORNS.

THE IRREPRESSIBLE AMERICAN "IBEX."

THROUGHOUT the Rocky Mountain region from El Paso to Dawson City belief in the existence of an undiscovered American Ibex springs eternal in the human mind. Again and again has the creature been seen and reported, with positiveness and particularity. From the State of Washington, one man sent a very good drawing of its head and horns, and from Colorado came a photograph, an admirable description, and measurements, of a specimen which had actually been shot and mounted. Two really distinguished sportsmen of our acquaintance were with some difficulty convinced that a journey in pursuit of the horned mystery would be a waste of time.

The spirit of investigation which prompts the pursuit of a mysterious animal, is highly commendable. Without it the scientific world would lose much. At the same time, it is unfortunate that all Rocky Mountain hunters can not know that there really is not the faintest tivity and become wild and self-supporting. Such animals account for some of the "ibexes" that have been observed. A pair of horns and a pelt recently sent to us by Dr. D. T. Mac-Dougal, from the Desert Botanical Laboratory at Tucson, Arizona, illustrate another source of honest belief in the existence of an American Ibex. Dr. MacDougal, who is himself a keen naturalist, had no difficulty in naming at sight the species which these specimens represent, but he kindly elected to afford us another practical demonstration of an "Ibex" story reduced to its lowest terms. The animal shot as an "Ibex" in the Santa Catalina Mountains of Arizona proves to be a big-horn mountain sheep, female, (Ovis canadensis), about four vears old. As in all horns of female mountain sheep, these describe only a quarter of a circle, and in their lack of curvature they are slightly goat-like.

Beyond doubt, the many "Ibex" stories and queries that have so frequently arisen during the past fifteen years, originated in honestly made but wholly erroneous observations of domestic goats running wild, of mountain

sheep ewes, whose horns always are short and rather straight, and of young mountain sheep

In this connection, it may also be noted that in many instances female white mountain sheep seen at a distance have been mistakenly identified as mountain goats.

W. T. H.

THE YEAR'S PROGRESS.

URING the year 1906, development work in the Zoological Park has been prosecuted with the usual degree of industry, and the program of the Zoological Society is rapidly nearing completion. The series of installations for mammals was increased by the erection of an important building, known as the Small-Deer House, designed to contain a collection of small tropical deer and antelopes, such as are not provided for elsewhere. This building is situated near the southern boundary of the Zoological Park, midway between the large Antelope House and the Pheasants' Aviary. It is built of buff brick of the standard color in use in the Park, and is surrounded by an extensive series of outdoor yards. It will contain between thirty and forty species of animals. Its interior is particularly pleasing in its proportions and light effects.

The accommodations for birds were increased by the erection of what is known as the "Glass Court," which is really an annex to the Large Bird House. This addition has been specially designed for American song-birds, and was completed last summer. It is now well stocked with the species most dear to the hearts of American boys and girls, and is a favorite spot for teachers and classes from the public schools.

In the line of general improvements, the most noteworthy feature of the year has been the erection of the western boundary wall and the northern front of Baird Court. The latter constitutes a very imposing composition of stone stairways, sculptured fountains and ornamental balustrades. These two sides of Baird Court have been completed. To-day work is progressing on the Concourse, by which visitors will enter the Park and drive from Pelham Avenue to the northern stairways of Baird Court. When finished this feature will form an imposing approach to the finest group of buildings in the Park.

Near the Service Building a large Feed Barn, of buff brick and concrete, was erected for the storage of large quantities of grain, hay, and straw, and the temporary sheds formerly occupying that site were torn away. The barn

has been surrounded by a brick wall, capped with green tiling, and the interior of the yard thus created has been properly paved.

Other improvements now in progress are to be found in the new Boat-House and Restaurant, at the lower end of Bronx Lake, near West Farms, and a new entrance at the intersection of 182d Street and the Southern Boulevard—to which walks were constructed last year. Immediately south of this entrance, the Zoological Society has planted an extensive group of cedars, ranging in height from twenty to forty feet, planted very close together, for the purpose of screening the Park at that point from the buildings at West Farms.

A new service road was constructed from the Rocking-Stone past the Buffalo House, to the Buffalo Entrance on the Boston Road, and in connection with this construction the Buffalo corrals were completely remodeled and rebuilt.

The attendance of visitors at the Park during the past year has exceeded that of any previous year by about 100,000. While the figures for the whole year will not be known until January first, the total number will not fall short of 1,300,000. A large portion of this increased attendance is due to the great number of pupils from the public schools who have been brought to the Park by their teachers, in order to utilize the collections as object lessons in nature studies. While no attempt has been made to record the number of school pupils who have visited the Park for purposes of study, the total number can not have been much less than 20,000.

While it is impossible to forecast with certainty the date of the practical completion of improvements in the Zoological Park, it is safe to say that the end is not far distant. Important additions to the series of buildings will be made during 1907, and as rapidly as new animal buildings are completed, the Zoological Society will fill them with animals. The number of living creatures on exhibition in the Park is far greater than ever before, having gone beyond 3,000.

COLLECTING FOR THE AQUARIUM.

In THIS number of the BULLETIN are several illustrations showing the manner in which fishes are taken with the seine or drag-net for the use of the Aquarium.

Nearly all of the commoner fishes on exhibition at the Aquarium are obtained from local waters within an easy day's journey of the Battery, and the bulk of the fresh-water fishes



SEINE-BOAT STARTING OUT.

come from the Bronx River and the lakes of Central and Prospect parks. Occasional fishing trips are made to ponds on Long Island or convenient places in New Jersey. Nearly all of the following species are readily obtained from the Bronx River, within the limits of the Zoological Park, and from Central and Prospect parks: Common carp, mirror carp, common roach, small-mouthed bass, large-mouthed bass, white perch, yellow perch, sunfish, rudd

or pearl roach, brook sucker, chub sucker, longeared sunfish, bullhead, pickerel, fresh-water killi-

fish, gold fish.

For the longer trips the wagon is off with the big fifty-foot seine and the fish tanks by daybreak, the collector, with two or three men from the Aquarium, starting later and reaching the seining ground by the time the wagon arrives. After the seine has been stowed in the stern of any convenient boat, the haul rope of one end is passed ashore. The boat then makes a wide sweep, while the collector is paying out the seine. The haul rope at the other end is then carried ashore and the net: is slowly dragged toward the beach, where the fishes wanted are carefully lifted with dip nets into the tanks of fresh water.

During the long drive back to the Aquarium, it is not usually necessary to change the water in the tanks or to aerate it by lifting with a dipper and pouring back. The motion of the wagon seems to splash the water sufficiently for the time being. Care is always taken that the specimens are not so crowded as to exhaust the oxygen in the water or to make it slimy. The collecting of fresh-water fishes is done chiefly in the spring and late in the fall.

Occasionally the seine brings to shore desirable specimens of turtles, crayfishes, fresh-water mussels, newts, frogs and tadpoles. Some of the lakes of Central Park abound in the so-called pearl roach or European rudd, which was placed there many years ago. Gold fishes are easily obtained in the park lakes. Very fine specimens of pickerel and black bass can, at times, be had in the Bronx River.

As the park lakes are not fished except for



THROWING OUT THE SEINE.



HAULING IN THE SEINE.

the purpose of securing specimens for the Aquarium, most of the species originally placed in them have become extremely abundant, in fact, some of the lakes have gradually become so overstocked that the fishes are rather stunted in size from lack of food. Frequently the collector after making his selections throws back one end of the seine and allows hundreds of fishes to swim away.

As far as the lakes are concerned, it would

perhaps be better if the increase from year to year could be removed systematically. In the rivers, overstocking does not take place, as predatory fishes, such as bass and pickerel, devour great numbers of the young of other species, thus checking their increase.

When a haul of small fishes is made from an overstocked lake, quantities are often turned over to the keepers of the bird houses at the Zoological Park and Central Park Menagerie as food for sea birds.

IN SEPTEMBER the Aquarium received from Key West, Florida, a green turtle which weighed

five hundred and forty pounds. Its total length was five feet nine inches, and the length of its top shell was four feet and six inches. This is the largest green turtle ever brought to the Aquarium.

The writer has seen nothing as large in any museum in America and does not remember having seen anything approaching it in Europe.

It died from injuries received during shipment and was sent to the American Museum of Natural History

The Key West turtle shippers claim that they get at least one turtle a year weighing as much as six

hundred pounds and an order has been placed with them for another specimen.

The green turtle ranges the Atlantic from Long Island to Brazil, but is rarely seen far north.

The four hundred pound loggerhead turtle, the three hundred and thirteen pound green turtle, and the sixty pound hawksbill turtles, which have been in the Aquarium for several months are in fine condition.



LANDING THE CATCH.

In OCTOBER last, the Aquarium received from a market in New Orleans, fine specimens of the giant snapping turtle, (Macrochelys tenumincki), inhabiting the lower Mississippi River and its tributaries, varying in weight from fifty-five to eighty-two pounds. This species is the largest of the fresh-water turtles. There is a specimen in the United States National Museum, five feet and four inches in length, which weighed one hundred and fifty-five pounds, its top shell being twentynine and one-half inches in length.

The Aquarium had a specimen in December, 1902, which was four feet seven and one-half inches in length and weighed one hundred and six and one-half pounds, in an emaciated condition. Its top shell measured twenty-four

inches in length.

This species is sold for food in the New Orleans markets and is sometimes shipped to

New York.

EVERY summer the Aquarium procures a number of tropical fishes from the numerous pound nets located in the southern end of New York Bay. These fishes appear late in the season when the water has reached its highest temperature and, recognizing them as rarities, the fishermen usually place them in floating fish-cars and inform the Aquarium.

Among the fishes taken in October was a specimen of the flasher or triple-tail, (*Lobotes surinamensis*). It is a large food fish, sometimes attaining a length of three feet. There are a few records of its occurrence as far north

as Cape Cod.

THE year 1906 has proved to be a record year at this institution, the total number of visitors having been over two millions, an average of six thousand a day.

The attendance for 1906, taken with that of preceding years, makes the total for ten years over seventeen millions, an average of over five thousand a day for that period.

A WISE ELEPHANT.

Our fine Indian Elephant, "Gunda," has not only grown stouter and taller, but he has also developed in intelligence and sagacity in a manner that is bound to make him famous. The greatest care has been exercised with his training, food, and every-day life, and thus far it appears to be labor wisely expended. If actions

speak for themselves, he appreciates the attention bestowed upon him. In numerous ways he indicates his complete satisfaction as to his bill of fare and the kindness of the keepers. He kneels at command, salutes, shakes hands, and has lately become a banker. Some of the devious methods he employs in his particular bank indicate that there will be serious trouble unless he mends his ways.

If one throws a penny on the floor, he picks it up and drops it into the box above his head, after which he rings a bell with his trunk. Then he looks for a reward. If it is not forthcoming, in the shape of forage biscuits or peanuts, he

rings the bell until it does come,

It was soon apparent that although the deposits were heavy, there was also a correspondingly heavy shortage. Upon inspecting the books it was learned that the teller dropped the cent into the box, but afterward very deftly picked it out and put it into his mouth. When the keeper was away he put it on the floor until a visitor came along, when he went through the form of dropping it in again, and ringing the bell. To prevent this fraud small staples were driven in the bottom of the box, so that the penny fell between them. He simply elongated the tiny tip at the end of his trunk, and therewith lifted the cent. It was only by using long nails in place of the staples that the trick was prevented.

But "Gunda" was equal to the occasion, and developed another trick which easily rivaled the former. One morning while standing near by, his keeper heard a penny drop into the bank, then another, until he counted four. Stepping quickly to the front, he saw the wise old fellow reach to the top of the partition wall with his trunk. When detected "Gunda" slyly walked away. On looking into the hidingplace, nine pennies were discovered. E. R. S.

During the past months the Aquarium has received numerous specimens of starfishes and Holothurians from the new steam trawler Spray, of Boston. This vessel, built on the lines of the British steam trawlers, is one of the pioneers in this method of fishing in America, and her work is being watched with great interest by the fishing firms of New England. Having been dredged from deep water on the Western Bank, none of the specimens sent to the Aquirium lived more than a week. It was demonstrated that they can not endure the reduced water pressure of aquarium tanks, and shipments have been discontinued. C. H. T.



YOUNG MALE HIPPOPOTAMUS BORN IN CENTRAL PARK.
Purchased and presented to the Society by Mr. Samuel Thorne



GUNDA COMPLAINS OF THE NUMBER OF VISITORS WHO RIDE ON PASSES.

PREPARED BY THE DIRECTOR OF THE AQUARIUM

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THE CARE OF GOLDFISHES.

As THE care of goldfishes is a subject of constant inquiry at the New York Aquarium, the following information has been compiled from the best authorities for the benefit of correspondents.

The general principles of aquarium management, so far as they relate to the form of the aquarium, its plant life, water supply, temperature, position with reference to light, and the feeding of its inhabitants, will apply to many other kinds of fishes.

An aquarium holding eight or ten gallons of water will be easier to maintain in good condition, than one of small size, and will contain a larger number of fishes with a greater degree

of safety. An aquarium of rectangular shape is by far the best for permanent use. It should be of strong clear glass—preferably plate glass—set in a metal framework, and with a slate bottom. Its corners, however, accumulate dirt which is not easily removed.

Aquaria of rectangular form, made wholly of glass, can be purchased and are cheaper, but the glass is never quite clear, and they crack more readily from changes in temperature. Cylindrical, glass aquaria are still cheaper, but they distort the forms of the objects they contain to some extent, and are also liable to crack from water pressure. However, aquaria made wholly of glass have the advantage of



FANCY JAPANESE GOLDFISH.

Presented to the New York Aquarium by Mr. Henry Bishop of Baltimore.



ROUND GLASS AQUARIA.

being absolutely water-tight, while they remain in sound condition, whereas the joints of metal-framed aquaria may leak.

Globes are worthless. Good results can not be expected with them. The restricted surface of a globe at the top lessens the amount of water surface exposed to the air. The more surface exposed for the absorption of air, the better.

The aquarium should be placed where the amount of light reaching it can be well controlled. A north window is best, an east window will do, but exposure in other directions will make its care more difficult. If large, the aquarium should be located before it is filled with water.

Sunlight should not often be allowed to fall directly on it, as it stimulates the growth of algae, and is liable to overheat the water, the temperature of which should be kept steady, not rising above 70 degrees or falling below 40 degrees. A temperature of 50 degrees to 60 degrees is best, and it should not be allowed to vary. Warm water holds less air than cold water, so that a high temperature is more to be guarded against than a low one.

Water plants are necessary in the aquarium for the aeration of the water, since under proper conditions of light and temperature they give off oxygen which animals require, while the latter exhale carbonic acid gas. A balance between the animal and plant life of the aquarium is essential for success. Too much plant growth can be checked by reducing the amount of light, which may be shut off by the use of a screen or shade. A greenish film of algæ or confervæ will at times develop rap-

idly on the glass and obscure the contents of the aquarium. It will have to be rubbed off occasionally, but it is just as well to let it grow on the side next the window where it will serve to restrict the light and also aerate the water. The growth of algæ is lessened by placing the aquarium in a more shaded position. Snails eat algæ rapidly and should be introduced for that purpose, and also because their eggs serve as food for small fishes.

Allow the aquarium to absorb air from its plant life and from the surface of the water for a day or two before putting in the fishes. The latter should be few in number at first. Snails may be added later. Dealers in aquarium supplies usually keep plants, snails, tadpoles, newts, and other small creatures as well as fishes.

With running water, plant life can be dispensed with. A collection of large goldfishes in the New York Aquarium has been kept in good condition for many years in flowing Croton water, standing its low temperature in winter very well. The fish are, however, much more active in summer and feed more freely.

The following named water plants are those most frequently used by aquariists; milfoil (Myriophyllum), hornwort (Ceratophyllum), fanwort (Cabomba), water-weed (Anacharis), tape-grass (Vallisneria), arrow-head (Sagittaria) and pondweed (Potamogeton). Many other species will serve the purpose. Plants may be anchored by pressing them down into the sand or gravel. Thin strips of lead wound loosely about their roots will hold them securely.



GOLDFISHES REARED AMONG WATER-PLANTS.

In a well-balanced aquarium the water should not be changed at all. It is in fact better without any additions, other than that required to replace what is lost by evaporation. Water should never be added until it has been kept in the same room with the aquarium long enough to acquire the same temperature.

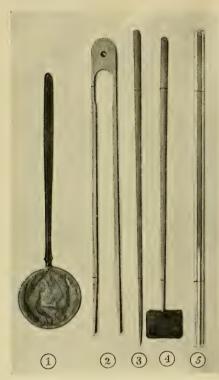
In siphoning out water from the bottom of the aquarium to clear off sediment or refuse, the water should be saved and strained back. The supply of water may be aerated at times by lifting it with a clean dipper and letting it fall back slowly. A sprinkling can will also serve for this purpose. All vessels and apparatus used in connection with the aquarium should be perfectly clean, and it is well not to put the hands into the water at all. Assistance in the way of keeping the aquarium clean may be had by introducing a few tadpoles and small newts to act as scavengers, but the latter should be of very small size.

The bottom of the aquarium should be covered to the depth of a couple of inches, with fine gravel, or clean white sand in which fishes may rub themselves; it is also essential for the rooting of plants.

There should not be too much animal life in the aquarium. The fewer and smaller the fishes the less likely is the air in the water to become exhausted. Two or three small gold-fishes to each gallon of water is a safe rule to go by, if the aquarium is large. If small the proportion must be reduced. The question the aquarium presents, when it has been supplied with water and plants, is simply, how many fishes or other air consuming creatures can be accommodated in the quantity of water available? Overstocking may disturb the balance within an hour.

It is probably safe to say that a little neglect in the matter of feeding is better for the permanence of the aquarium than over attention. It must not be presumed that because fishes will live for months without feeding, it is right to treat them in that way. Fishes left without food are simply fishes kept hungry and in a condition of slow starvation, which can only be described as cruelty. When there is a large supply of plants in the aquarium the fishes hold out longer, the very small ones especially getting some nourishment from the young shoots of Anacharis and other plants.

Many aquariists feed every day, carefully removing all uneaten food, which soon decays and fouls the water. Wafer food, made of rice flour, and other prepared foods kept by aquaria dealers are safe, and should be supplied at least every other day. Finely crushed vermi-



AQUARIUM IMPLEMENTS.

1. Net. 2. Forceps. 3. Stick for Feeding. 4. Swab for Cleaning. 5. Tube for taking up Refuse.

celli is also good. Some of the ordinary household cereals are available as goldfish food, but the beginner should experiment with them cautiously. Other foods are, however, desirable at times: Once a week, pieces of very small earth worms, or bits of fresh beef should be furnished. If they can be given to each fish on the tip of a broom straw the chances of contaminating the water by waste food will be lessened. All uneaten food must be picked, dipped, or siphoned out, or foul water and a disturbance of the delicate balance of the aquarium will be the result. A milky appearance of the water is usually a warning against careless feeding. Nearly all diseases which appear among goldfishes indicate that the aquarium needs looking after. The unsightly growths of fungus on fishes, caused by the plant parasites, Saprolegnia and Devoca, indicate careless handling of the fishes, or bad conditions prevailing in the aquarium. When the conditions are right, diseases are not likely to appear. Too high a temperature favors the

growth of fish fungus.

This disease is hard to deal with and infected fishes should be removed at once and kept by themselves, where, under proper conditions, they may possibly recover. A pinch of salt put in the water with them may arrest the disease, but when in bad condition a teaspoonful of salt to each gallon of water will be necessary. If other fishes are obtainable, it is just as well to kill diseased specimens, since the fungus roots penetrate well into the flesh and can not be destroyed if the growth is far advanced. Animal parasites on fishes should be picked off after the fish has been carefully lifted in the dip net.

One of the first indications of trouble in the aquarium, is the presence of the fishes at the surface with their mouths out of the water, showing that they are suffering from lack of air. The water may be dipped up and allowed to fall back slowly, but the relief afforded will be merely temporary. The temperature of the aquarium should be observed and some of the fishes removed. It may be necessary to increase the quantity of plant-life or stimulate its growth by admitting more light. weather is not cold and the window can be opened, air blowing across the surface of the water will be helpful, since it may only be necessary to aerate the water and lower the temperature somewhat. There may be refuse on the bottom which should, of course, be removed.

In taking care of the aquarium, a few simple implements such as a half-inch rubber tube for siphoning out the water, a glass "dip tube" for removing small particles of dirt from the bottom, a shallow dip net of cheese cloth for lifting fishes and a cloth-covered pad or rubber scraper, with a long handle for cleaning the glass, will be necessary. The dip tube is operated by closing the top opening with the finger to admit or exclude the water as desired. A pair of long wooden forceps and a slim stick are also useful for moving plants and other objects without putting the hands into the water. The accompanying cut shows some of the implements used by Mr. Spencer of the Aquarium staff.

One other aid in the management of the aquarium should not be overlooked: A reliable book on aquaria and their care is essential, and the amateur will need to refer to it frequently.

A list of such books was published in the BULLETIN for April, 1906. Any of the following, for sale by booksellers generally, will be found useful:

The Home Aquarium, and How to Care for It.—A guide to its fishes, other animals, and plants; with many illustrations. By Eugene

Smith. Duttons, New York, 1902.

The Amateur Aquarist.—How to equip and maintain a self-sustaining aquarium. Illustrated. By Mark Samuel. Baker & Taylor Co., New York, 1804.

The Goldfish, and its Systematic Culture.— A thorough guide for goldfish keeping and goldfish breeding in the house and out of doors. The construction and care of the parlor aquarium and ponds for breeding. Illustrated. By Hugo Mulertt, New York, 1902.

The Book of Aquaria.—Being a practical guide to the construction, arrangement, and management, of fresh-water and marine aquaria. Illustrated. By the Rev. Gregory C. Bateman, A.K.C., and Reginald A. R. Bennett, M.A. Part I—Fresh-water Aquaria. Part II—Marine Aquaria. Scribner's, New York, 1002.

The small aquaria in the laboratory of the New York Aquarium will be shown to visitors making inquiry about them, and their management in detail explained by those in charge.



WOOD-"TURTLE."

CARE OF TURTLES AND SMALL ALLIGATORS.

THESE animals do not thrive in the hands of the amateur, especially in winter, if one may judge by the number of emaciated specimens annually presented to the Aquarium.

The returning Florida tourist usually has some baby alligators, which refusing to feed in our chilly northern climate, are brought to the Aquarium, perhaps during intensely cold weather, in nothing warmer than a pasteboard box. If this last thoughtless act does not finish them at once the attendants may be able to pull them through. Cold-blooded reptiles such as turtles and alligators must have warm quarters. They should be kept in aquaria or other vessels into which sunlight can enter, and the

vessel placed where it will not become cold. If kept near a window for the benefit of the sunshine, which is life to them, care should be taken that they are also near a heater.

The temperature of the ordinary living-room in winter is scarcely high enough to keep alligators active, since they need a warmth of 75 to 85 degrees. They require not only warm water, but a place where they can crawl out at times. The water need not be more than a few inches deep, and the platform or small log on which they rest should be placed in such a way that they can climb upon it easily. Alligators in captivity are most comfortable and active when they have access to water that is nearly tepid, and it is their habit to float much on the surface. Turtles require not only warm water, but also the heat of the sun. For that reason turtles do not flourish as well in the



MUHLENBERG'S TURTLE.

New York Aquarium as they would in a building more accessible to sunshine. The temporary warming of torpid alligators or turtles in boxes set near a heater is useless. If they can not be kept where both air and water are permanently warm, they should be dispensed with.

The numerous chilled and weak alligators sent to the "Zoological Park" each year, are placed in the sunny Reptile House in a tank of

water with a steam pipe in it. After a thorough warming up in water of 80 to 90 degrees temperature, they begin to feed, and in three years will be a yard long, and weigh twelve or fourteen pounds. The State of Florida is making a mistake in allowing the present heavy export of young alligators, which are practically all lost by being carried north. Large alligators are now scarce, and the supply of alligators for leather is almost exhausted.

Since alligators and turtles do not feed unless kept permanently warm, it is necessary to first provide them with quarters where they will have a temperature of certainly not less than 75 de-

grees of both air and water. They should also have the benefit of sunshine. Forcing cold alligators to eat by cramming food into their mouths is admissible only temporarily. They will eat freely when the water and air are warm enough, and will grow amazingly. They eat such a variety of foods that it is easy enough to provide for them.

Alligators and snapping turtles are flesh eaters and may be provided with small minnows, frogs, tadpoles, worms, grubs, crayfish, shrimps, and small crabs, either dead or alive. When these can not be had, they will eat fresh chopped meat, fish, clams, and oysters. Many kinds of turtles will

eat all of the above named foods, as well as snails, small aquatic mollusks, and insects. Others like very tender, green vegetables, such as tomatoes, lettuce, celery, and various water plants. The food of some species consists largely of the bulbs of sedges, (Cyperus), while with others it is chiefly small watermollusks.

Some of the turtles are active fish eaters, and will do well if supplied with live minnows. The



BOX TORTOISE.



SNAPPING TURTLE.

wood-"turtle" and other species which forage on land as well as in the water, are fond of berries, mushrooms, and many kinds of fruits and vegetables, while nearly all kinds will eat grubs. The tortoises eat berries, mushrooms, and some garden vegetables as well as grubs and worms,

Turtles should be provided with a variety of foods until the kinds suited to each species are ascertained. Many species of turtles feed only under water, consequently it is absolutely necessary for them to have access to it when fed.

If their surroundings can be made to approach natural conditions—that is if they can have access to a compartment in their quarters where there is dry sand, earth and sods, where grubs, worms, and other food can be thrown in abundance, success in keeping them will be more likely to follow: And it is remarkable, how quickly they learn the exact location of food and drink. Once fed in a certain location, they will invariably seek that place when urged by hunger.

The illustrations show some of the land and fresh-water turtles found in the vicinity of New York. Opening Hours,—Summer opening hours at the Aquarium begin on April 15, when the building will be open to visitors from 9 A. M. to 5 P. M. daily. The building is closed Monday forenoons.

Fishes of New Jersey.— The New Jersey State Museum at Trenton has recently issued, in connection with its annual report, a work of 436 pages on the Fishes of New Jersey, by Henry W. Fowler. It is fully illustrated and about the same size as that issued in 1903 by the New York State Museum at Albany, on the Fishes of New York,

by Tartleton H. Bean. These two works, taken in connection with the illustrated List of the Fishes of Rhode Island, by Henry C. Tracy, cover very thoroughly the fish life of the regions about New York City. The last named paper is from the 36th Report of the Commissioners of Fisheries of Rhode Island. Other papers on the natural history of aquatic animals found in the region about New York City have been published by the American Museum of Natural History, the Zoological Society and the Linnean Society of New York



SPOTTED TURTLE.

ZOOLOGICAL SOCIETY BULLETIN

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THE CENTENNIAL OF THE AOUA-RIUM BUILDING.

The three old prints re-published in this number of the Bulletin, seem to be appropriate, since this appears to be the Centennial year of the Aquarium building, the construction of which was begun in 1807. They will doubtless be welcomed by all readers who are interested in the early history of New York, and the preservation of historic landmarks.

The Director of the Aquarium recently received from the War Department a letter, relative to the construction of this building, from which the following notes are extracted: I. "Many of the letters and reports of the period during which the building was under construction are missing." 2. "A foundation should be made around the Bastion of the Old Battery, where the flagstaff is placed, extending forty or fifty feet from the present, and upon this foundation a Battery should be constructed in such manner, that the gun upon the right will take the North River, while that upon the left will range along the Courtine of the old Battery." (Instructions of the Secretary of War to Lieut, Col. J. Williams, July 21, 1807, 58510-115).

Col. Williams in a letter to the Secretary of War dated August 28, 1807, replied: "I find that I must go at least two hundred feet out from the Battery to have any command of the north river."

The deed from the Mayor, Aldermen, and Commonalty of the City of New York to the United States, conveying water lot, etc., is dated November 17, 1807.

The records do not show just when construction was begun, but the building was evidently not completed until three or four years after.

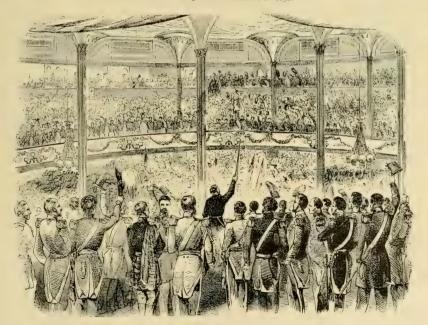
It might be appropriate for the Zoological Society to celebrate the Centennial of the building sometime in the autumn of the present year, perhaps by opening the Aquarium at night, as it is now being wired for additional electric lights.

The following from the Aquarium Circular of Information is reprinted as explanatory to the pictures showing the exterior and interior of the building, when it was known as Castle Garden:

History of the Building.—The Aquarium building was erected in 1807 by the United States Government as a fort, called Southwest Battery and after the war of 1812 was called Castle Clinton. It had a battery of 30 guns, the embrasures for which still remain in the outer wall, which is 9 feet thick. The old ammunition rooms are surrounded with walls of masoury 15 feet thick. In 1823 the building was ceded by Congress to the City of New York and used as a place of amusement called Castle Garden, which had a seating capacity of 6,000. It was connected with Battery Park by a bridge, the intervening space having since been filled in. General Lafayette was received here in 1824; President Jackson in 1832; President Tyler in 1843; Louis Kossuth in 1851. Professor Morse, inventor of the telegraph, demonstrated here in 1835 the practicability of controlling the electric current. Jenny Lind began singing here in 1850 under the management of P. T. Barnum. Among other notables received here were President Van Buren and the Prince of Wales. The building was used as a landing place for immigrants from 1855 to 1890, during which period 7,690,606 immigrants passed through its doors. It was opened as an aquarium by the City on December 10, 1896, and on November 1, 1902, its management was transferred from the Department of Parks to the New York Zoological Society, a



THE NEW YORK AQUARIUM BUILDING IN 1852.



INTERIOR OF THE AQUARIUM BUILDING IN 1851. Kossuth addressing the military. From an old print,



JENNY LIND,

From an old music sheet published in New York in 1847, shortly before she began singing in Castle Garden.

private scientific association with a membership of 1,644.

The number of persons who entered the building while it was called Castle Garden must have been very great. As an Aquarium the attendance for the 10 years ending December 31, 1006, amounted to 17,103,328,—an average of 4,685 visitors a day. The attendance for the year 1906 was 2,106,569,—an average of 5,771 a day.

A WHALE ENTANGLED IN A SUB-MARINE CABLE.

EARLY in November, last, an officer of the Central and South American Telegraph Company called at the Aquarium with a letter from Mr. Kingsford, the electrical engineer of the company, in regard to the interrup-

tion of the sub-marine cable between Iquique

and Valparaiso, Chili.

The interruption, which occurred on the 14th day of August, was caused by a large whale, that was afterward drawn to the surface by the repair steamer "Faraday," from a depth of 400 fathoms.

The engineer desired to know to what depth a whale can descend, and whether an airbreathing mammal could stand a water pressure of nearly half a ton to the square inch,

The cable in which the whale was entangled, weighed in air, while wet, 1,715 tons per nautical mile, and had a breaking strain of 6.06 tons. The cable's weight in salt water was 1,005 tons per nautical mile. If the whale came to the surface to blow, he must have held two or three miles of cable in suspension. This, however, is unlikely, since it had four turns of the cable around its body, one being in its mouth.

When the trouble with the cable was discovered, tests from Valparaiso and Iquique placed the break about thirteen miles from the latter place. On August 16th the "Faraday" left Iquique for the position of the break, and commenced grappling in 342 fathoms with 500

fathoms of rope out.

The cable was "hove up," cut and tested to Iquique. The end was buoyed, and the ship grappling farther out, picked up the cable, which came in badly twisted and with increasing strain. A large whale was brought to the surface completely entangled in the cable. The stench being unendurable, the cable was cut close to the whale and the vessel moved to windward. Tests were made and Valparaiso spoken. The ship made four soundings in the vicinity which showed a depth of 415 fathoms (2,490 feet, nearly one-half mile).

It is extremely doubtful whether an air breathing animal can go as deep as 400 fathoms, and as that depth is much below the limit of pelagic life on which most whales feed, it is not likely that the whale would penetrate such a depth. Total darkness, moreover, pre-

vails in depths of 400 fathoms.

According to the records of whalemen, whales have been known to stay under water over an hour, and after being harpooned, to have carried out a mile of line before reappearing at the surface, although this does not necessarily mean that the line was carried down vertically.

During the work of the Bering Sea Commission, when an exhaustive study was made of the food of the fur-seal in Bering Sea, we found that seals fed almost exclusively on

small surface life, although the seals dissected were taken at points where the depth was less than 100 fathoms, and where codfish were

abundant at the bottom.

The Valparaiso-Iquique cable was laid on January 27, 1906. At first sight it seems unlikely that the whale entangled in this cable could have remained eight months without complete disintegration or being gradually consumed by small forms of life on the bottom. The deep sea, however, is intensely cold, the temperature being close to the freezing point of fresh water, and the carcass, unless actively attacked by bottom life, might be expected to last longer than in the warmer surface waters.

Since, from what we know of air-breathing animals, it is unlikely that the whale would descend 400 fathoms of its own accord, and as a deep-sea cable is not laid very slack, it is doubtful that the whale could have fouled it at

the bottom.

The logical conclusion is, that it became entangled during the laying of the cable, eight months before, when there was a considerable length of it in suspension. The twisted condition of the stiff and heavy cable about the animal shows that the energy expended in the vain effort to free itself must have been enormous.

There are several well authenticated instances of sub-marine cables interrupted by whales, one having been described by Gen. Greely in the Alaska cable between St. Michaels and Nome. In this case the whale fouled the cable in comparatively shallow water. Cables can not always be laid perfectly flat on the bottom, since they are probably suspended for short distances between sub-marine ridges.

FISHES WHICH DEFEND THEIR YOUNG.

AMONG the native fresh-water fishes now in the Aquarium, which have the habit of making nests and caring for their eggs and young, are the black and rock-basses, several species of sunfishes, crappies, catfishes, sticklebacks, and the bowfin or mudfish. The marine species which exercise guardianship over their progeny are at present represented by the sea-horse, pipefish, and sea-catfish.

Fishes were long credited with indifference to the fate of their young after the eggs had been deposited, but we now know that the number of those which actively protect their nests, and for a time at least keep their young

together, is very great.

Since the care of eggs and young is practiced by the fresh-water species mentioned, which happen to be food fishes, it appears that we are indebted to the modern fish-culturist for much of what we know about them. The keeping of such fishes in ponds has resulted in a closer observation of their habits, than was practicable before fish-culture became a common industry. It is in fact, only a few years since it was demonstrated that in the case of the black basses, the male fish is the protector of the nest, rather than the female.

The nest-building tendency of fishes is not often manifested by them in the tanks at the Aquarium. Their quarters are necessarily restricted and the crowding of specimens makes the conditions unnatural. Occasionally, however, mature sunfishes make attempts at nest building, one or two fishes settling down to the bottom of the tank where they soon work out a saucer-like depression in the gravel. Their constant excitement, caused by the driving off of other fishes which may descend too near them, soon breaks up the attempts at pairing.

The care of the eggs and young by sticklebacks of different species is well known, as these fishes have long been under observation as aquarium pets. The nest of the stickleback is an unusually elaborate one constructed by the male, who also protects the eggs and

young.

It is believed that the nests of the basses, crappies, and sunfishes are hollowed in the sand or gravel by the male fish. After the female has spawned she deserts the nest, the male fish remaining on guard many days fanning the eggs with his fins, keeping them clear of sediment, and actively driving away intruders of all species. When the young rise from the nest they are herded together for some days until active enough to strike out for themselves.

Our native sunfishes are so abundant everywhere and lay their eggs in such shallow water, that their nest-protecting habits are well known.

A good account of the sunfish and its nest, written nearly seventy years ago by Thoreau, may be found in the second chapter of "A Week on the Concord and Merrimac River," and will prove to be pleasant reading.

Several species of our native catfishes are known to care for their eggs and young, and it is not unlikely that all of them do so. The common catfish or bullhead, (Anciurus nebulosus), makes a depression in the ground not unlike that formed by the basses and sunfishes, the male being sometimes the only active party

in the construction of it. With all of these species the diameter of the nest is considerably greater than the length of the fish excavating it. Sand is moved by the fanning action of the fins and tail, while the larger gravel is carried to the rim of the nest in the mouth. Like the basses and sunfishes, the catfishes also protect the nest and lead away the schools of young fishes, the parent, as Thoreau says in the book above mentioned, seemingly "caring for them as a hen for her chickens."

The bowfins, (Amia calva), are hardy fishes in captivity, and there are specimens in the Aguarium which have lived there many years, but they have never shown any tendency to make nests or deposit eggs. Under natural conditions the male bowfin excavates a shallow nest under the shelter of water plants, digging more or less with the snout. The female may deposit eggs in more than one nest, or two of them may spawn in the same nest. may also be several thousand eggs laid in one excavation. When the male assumes guard, intruding fishes are driven off with great activity, his work lasting more than two weeks before the young are ready to leave the nest. and probably for a still longer period before the young scatter.

The catfish and the bowfin have frequently been observed to take the eggs and young in their mouths in working about the nest, and

to eject them uninjured.

Among the sea-horses and pipefishes also the male is responsible for the care of the eggs, receiving them directly from the female into his abdominal pouch, where they are carried until the development of the young gradually crowds them out to shift for themselves.

The male of the sea-catfish, (Galeichthys felis), takes the eggs, which are large and few in number, in his mouth where they are

carried until hatched.

POISONOUS FISHES.

MANY kinds of fishes are provided with poison-glands in connection with the spines on the gill covers and fins. This is especially true of the group of catfishes found in tropical America. In some cases the poisonous spines are barbed or serrated, as in that of the sting-ray. The spine in this species is located on top of the tail, and severe wounds are sometimes received in the leg by persons stepping on the fishes, the tail being thrown forward with considerable force.

There is more or less poisonous matter about

the head and dorsal spines of some of the sculpins, and irritating wounds are often received in handling them. The writer's hands have been made very sore at times by the spines of South American catfishes.

The spines of the common catfishes of the United States are poisonous enough to injure the hands severely, in fact the family of fishes called scorpænoids are so named because of their scorpion-like stings. Poisonous spines are in most cases a means of defense to the fishes possessing them. Most injuries received from them are caused by wading bare-footed in waters where such species are abundant. Even the mucus of many fishes is irritating if it gets into cuts on the hands.

The flesh of some fishes is also poisonous, especially in tropical regions, and many edible species are known to be dangerous at certain

seasons.

This is believed to be caused by the fishes feeding on mussels, sea-cucumbers, coral polyps, and jellyfishes at their spawning seasons, when alkaloids are developed by eating such foods. Poisons of this kind may be encountered in eating mussels and clams at the spawning period, but while serious illness may follow, death from this cause is rare. In the case of fishes suspected of being occasionally poisonous, it is a desirable precaution to remove the head and viscera at once after the fish is caught.

Among the fishes whose flesh sometimes becomes dangerous, are the barracouda, filefish, globefish, moray, lancet-fish, toadfish, some of the herrings and wrasses. In Cuba more than seventy species have been catalogued as occasionally injurious. When the flesh of fishes is poisonous it may often be recognized by its reddened coloration, caused by the food they have been eating. The roe and eggs of some fishes are also definitely poisonous at

The writer observed, while in Polynesia, that the islanders often would not eat fishes from the lagoons, but they had no hesitation about using those taken in outside waters. Natives often remove the spines of fishes before cook-

THE DRUM-FISH.

ing to avoid the danger of scratches from them.

THIS large fish, (Pogonias cromis) is found on our coast from Cape Cod to Florida, coming to the north in summer. It is said to reach a weight of 140 pounds. The size of the largest specimen now in the Aquarium does not exceed fifty-five pounds.

The flesh of the large drum-fish is not eaten, being rather coarse, and having at times a disagreeable smell. There is no demand for them in the markets, and when seen there are for show only. The young drum-fishes, those not weighing over four or five pounds are, however, marketable. Their flesh is firm, of a good flavor, and they are often sold for sheepshead to those who do not know the difference.

Drum-fish are very destructive to oysters. When a large school of them get on an oyster-bed they devour great quantities of them. To drive them away, oystermen

sometimes summon all who are interested in protecting the beds, and in numerous boats over the oyster-grounds, they make a vigorous commotion in the water, thus frightening the fishes away. This has been observed in Pelham Bay, N.Y., by Mr. J. B. De Nyse. The large drum-fishes with their strong jaws and pavement-like teeth have no difficulty in cracking the shells of good sized oysters. Those kept at the Aquarium easily crush small hardshelled clams.

Some years ago large drum-fishes were plentiful in Gravesend Bay and Upper New York Bay, but for the past fifteen years, only occasional large ones have been taken. They are however, taken in large numbers in the Lower Bay, and in the pound nets along the New Jersey coast southward.

The larger drum-fishes, not being used for food, and being so destructive to oysters are, when caught by pound net fishermen whose nets are not in the vicinity of factories where the fish are converted into fertilizer, killed and thrown away. Those caught by the menhaden fishermen, are carried to the factories and disposed of.

The drum-fish thrives in captivity. There are now in the Aquarium six large specimens weighing about fifty pounds each, and numerous smaller ones averaging about four pounds. One specimen of this fish placed in the Aquarium when it was six inches in length and weighing half a pound, lived four years and three months. At death it was twenty-four inches in length and weighed twenty and one-half pounds, showing an increase in length of



DRUM-FISH.

four and one-half inches, and in weight about five pounds per year. If this rate continued until the fish reached the weight of seventy pounds, it would require fourteen years to do so, and the length would be four feet, eight inches. The food given the drum-fishes in the Aquarium, consists of soft and hard-shelled clams, occasional oysters, rock-crabs, fiddler-crabs, shrimp, minnows, and herring, the latter being cut in strips of a suitable size for the fish. Drum-fish, however, prefer mollusks and crustaceans.—From the Notes of W. I. De Nysc.

Bluefish in Captivity.—In September, 1904, six bluefish were placed in one of the large wall tanks at the New York Aquarium. Of this number one lived until 1907, breaking the Aquarium record for a bluefish in captivity. When placed in the tank it was six inches long and weighed only a few ounces; at death it was twenty inches in length, five and one-quarter inches in depth, and weighed three and one-half pounds. Its growth for the first year was very rapid and was perceptible from week to week. Its food consisted of herring, menhaden and codfish, cut in strips of suitable size, with occasional live minnows and shrimps.

During the second year of its captivity it became restless and swam around the tank with considerable speed. The bluefish might possibly be retained in captivity for years in large salt water ponds in the South.—From the Notes of W. I. De Nyse.

BLIND FISHES.

IN USING the term "blind" fishes it should be explained, in so far as the fresh water kinds are concerned, that the fishes are not without eyes, but have practically lost the use of them through long-continued subterranean life. The eyes are very small and are so thickly covered with skin as to be useless. Blindness of this kind is found not only among cave fishes, but cave salamanders, crayfishes, and other crustaceans as well.

Blind animals are usually obtained by collecting from streams which flow through caverns such as that of the Mammoth Cave, and most of the species known have been described from caves in Kentucky, Tennesse, Illinois, Indiana, Missouri, Arkansas and Kansas.

Blind fishes and crustaceans are often brought to the surface through the agency of artesian wells. One genus of salamander, (*Typhlomolge*) is known only from an artesian well in Texas, where blind crustaceans

also frequently appear.

Blind cave fishes are usually small, seldom reaching a greater length than five inches. Some of the species are known only from caves or underground streams, while others are found in the same regions in surface waters with eyes better developed. The origin of some of these fishes is unknown, their ancestors having entered caves a very long time ago.

The principal genera are Chologaster, Typhlichthys, Amblyopsis and Troglichthys, the eye in the last named genus being the most degenerate. It has probably lived in caves and done without the use of its eyes longer than any other vertebrate. It inhabits underground waters in Missouri, Arkansas, and Kansas.

Three different genera and species are known to live in the Mammoth Cave in Kentucky, and specimens from there have at different times been brought to the New York Aquarium. One of these (Typhlichthys subterraneus), has been in the building two years. It is a very small fish, less than three inches in length. It is fed in summer on mosquito larve, when it can be obtained, and in winter on Gammarus, a small crustacean, two species of which are readily obtainable about New York Harbor, both in salt and fresh-water. Changes of light produce no effect on it, but it is extremely sensitive to disturbances of the water.

Another fish, nearly blind, lives in the dark water of the Dismal Swamp in Virginia and southward. Its eyes are well developed, but small. Two other species of blind fishes are found in caverns in Cuba, and a nearly blind

species of catfish is found in caves in Penn-

sylvania.

Some of the deep-sea fishes are totally blind, with no external appearance of eyes whatever. In such fishes the organs of touch are highly developed. Some of the deep-sea species also possess phosphorescent organs. The strictly cave animals are usually colorless, having the appearance of albinos, but the blind fishes of the deep-sea are dark or black.

AQUARIUM NOTES.

Aquari.m Improvements.—With new boilers, ventilating plant, and thermostat attachments to heaters, the Aquarium has been decidedly more comfortable to visitors during the past winter. The more equable temperature has doubtless been helpful in keeping some of the air-breathing animals in better conditions of health than heretofore.

Since the last Aquarium number of the BULLETIN appeared, the exhibits have been slightly increased, by the introduction of three very large table aquaria, to hold the collection of small alligators, some of the fresh water turtles, and the sea-horses. The last have done much better in their tank of stored sea water than in the wall tank supplied with water from the harbor. The refrigerating machine used in summer, the aerating plant and the pump and tank rooms—with their apparatus—have been thoroughly overhauled and painted.

The building is being wired for additional electric light, which is much needed on dark days. Some of the balcony tanks have been put out of commission for the introduction of new piping. Otherwise the exhibits are as large as the amount of tank space in the build-

ing will permit.

The Aquarium Fish-Hatchery.—The fish-hatchery has been kept in constant operation, the eggs of several species of fishes having been supplied, as heretofore, by the United States Bureau of Fisheries from Government hatcheries. The crop of young fishes has been large, and has been turned over to the State Fish Commission as usual.

The Manatee.—The small manatee presented by Mr. A. W. Dimock last September still feeds freely, and is doing well after six months of captivity. The bruises it received during transportation are healing slowly.

Game Fish.—Mr. A. B. Davis of Wading River, Long Island, presented to the Aquarium the collection of pickerel exhibited by him at

the Sportsmen's Show in March, permission for their transfer out of season having been granted by State Fish Commissioner Whipple. The yearling black bass and vellow perch raised artificially, and exhibited at the same show, by Mr. H. W. Beeman, of the Waramaug Black Bass Hatchery, at New Preston, Conn., were also presented to the Aquarium.

Servage Tests.—The Metropolitan Sewerage Commission has been granted the temporary use of one of the laboratories at the Aquarium and is at work on the study of the water and bottom deposits of the harbor. A launch has been engaged and samples of water and mud are being brought in for examination. Mud samples from different levels are obtained by boring, and all samples are tested chemically and bacteriologically.

Deposits of the heavier sewerage matter lie on the bottom of the harbor in some places many feet in thickness. The work is most important and the results should demonstrate the danger of emptying the sewage of Greater New York and vicinity into the harbor.

Sea-Turtles.—The measurements and weights of large sea turtles are so seldom given with exact figures that the following, relating to the largest specimens received at the New York Aquarium, should be placed on record: Green Turtle, (Chelonia mydas), from Key West, Florida. September, 1906. Extreme length 5 feet 9 inches, length of top shell 4 feet 6 inches, length of under shell 3 feet 4 inches, width of top shell 3 feet 5 inches, male, weight 540 pounds. Loggerhead Turtle, (Thalassochelys caretta), male, captured in New York Bay, June 20, 1906. Extreme length 5 feet 9 inches, length of top shell 3 feet 10 inches, length of under shell 2 feet 8 inches, width of top shell 2 feet 10 inches, weight 395 pounds.

Indian Visitors.—Mr. E. W. Deming, the artist, with three of his Indian acquaintances from the southwest, to whom he had been showing the sights of New York, visited the

Aquarium one day last summer.

Indians are stoical, and usually do not say much to white men about their impressions, but at the Aquarium they began to unbend. The big sea-turtles and the brilliantly colored tropical fishes were animals of a character so unexpected, that their interest at last found expression, and they came nearer an animated discussion than at any time during their trip. Mr. Deming afterward reported that the Aquarium, and the Winchester Arms Co.'s exhibit were the attractions which made the deepest impression on the Indians.

THE USES OF THE FINS OF FISHES.

By RAYMOND C. OSBURN.

THE fins are the most obvious organs of the fish, and although a great deal has been written about their structure, the knowledge of their functions seems to have been largely left unwritten, probably because it seems so evident that their uses are those of propelling. balancing, and steering the body in locomotion. While in a general way this is true enough. it is our purpose here to inquire how the various fins are applied to the performance of these functions. The writer has recently confirmed some observations made a number of years ago, by experimental work and many careful observations on the uses of fins of the fishes at the New York Aquarium, and this communication is written with the hope that it will call the attention of visitors at the Aquarium to the various uses of the fins, and to the varied and complex movements which fishes are able to perform. The general results of this work may be briefly stated as follows:

A. The pectoral fins have four distinct uses:

I. They are used for steering and steadying and for changing the course in swimming. They are usually held against the side of the body when the fish is swimming straight ahead rapidly.

2. When the fish remains suspended quietly in the water these fins are the principal ones used in keeping the equilibrium, and they are

then constantly in motion.

3. When the fish is moving and wishes to stop, the pectoral fins are thrown out at right angles to the body, thus very greatly increasing the resistance to the water and acting as a brake.

4. These fins are in most fishes capable of being used to propel the body. Most fishes can swim either forward or backward by the movements of these fins and occasional forms can move quite rapidly. For this use of the fins the doctor-fish, (Teuthis hepatus) and the tautog, (Tautoga onitis) in the Aquarium are worthy of study.

B. The ventral or pelvic fins are less important than the pectorals and are largely used to supplement them. In many short-bodied fishes they are situated directly or nearly beneath the pectorals, and are used in conjunction with them. They may be said to have the same functions as the pectoral fins, although to a less degree, and they may be seen to work in harmony with, although not always to move synchronously with them.



YELLOW PERCH.

Giving the names of the different fins, and showing the pectoral fin in motion.

C. Of the vertical or unpaired fins the use of the caudal is most evident, since this fin in conjunction with the caudal end of the body furnishes the propelling force in swimming. It is also the chief fin used in steering, acting like a ship's rudder, and its use as such may be easily observed when the fish is swimming slowly. The caudal fin may be used also in maintaining the equilibrium, in this respect supplementing the efforts of the paired fins. This use is best seen in very deep-bodied fishes such as the butterfly-fish, (Chaetodon).

The principal use of the dorsal and anal fins in the ordinary type of fish seems to be to prevent the body from slipping sidewise through the water when the stroke of the caudal is made. When these fins are removed the fish wriggles very noticeably while swimming. These fins may have also a direct use in propelling the body, and may aid the pectorals in equilibration. It is not within the scope of the present paper to discuss the varied special uses of fins by which certain fishes are enabled to fly, crawl, skip, attach themselves to stones or seaweeds, etc.

A glance at the results of experiments on the removal of fins may be interesting. When one of the pectoral fins is removed the fish tends to turn on its side. In the short deep-bodied type of fish this is very pronounced. In the killifish, (Fundulus heteroclitus) it is not very noticeable excepting at first, for in a short time the fish learns to keep its balance with the other fins. When both pectorals are removed in a deep-bodied form, such as the scup, (Stenotomus chrysops), the fish becomes quite unable to keep its balance properly, though it can

swim as rapidly as ever. In the killifish the removal of the pectorals. or even of all the paired fins, is not so serious a matter; the only evidences of difficulty are seen in the lack of ability to make the more accurate movements, and in the fact that at first the fish runs into things owing to its inability to stop quickly. The fish learns in a few days to overcome this latter trouble by a strong sweep of the tail. When the unpaired fins alone are removed the swimming movements become labored

and progress is much slower although in the killifish the caudal portion of the body is able to accomplish a fair stroke. If all the fins, both paired and unpaired, are removed the killifish is still able to swim by wriggling, and is able to retain its balance by the same method. Naturally all of the movements in such a case are extremely labored. The experiment shows, that in some fishes at least, fins are not necessary, though certainly very useful organs.

In conclusion it must be noted that the fins of fishes are very strongly adaptive structures, and that probably in no two species will exactly the same uses and the same combinations of fins to perform the various duties assigned to them, be found to occur. The whole subject will well repay any one who cares to observe the habits and movements of animals.

Publications on Aquatic Life.—Among the publications on aquatic life (referred to on page 339), may be mentioned, Sea Shore Life, by Mayer, The Reptiles and Batrachians by Ditmars, The Reptiles and Batrachians by Eckel and Paulmier, the Salamanders, Frogs and Toads by Sherwood, The Fishes, Turtles and Lizards, by Smith, and The Higher Crustacea by Paulmier. With this list to select from we need not remain unacquainted with the aquatic creatures in the vicinity of New York.

The cuts in this number of THE BULLETIN, are from photographs by Mr. Spencer and others, and from a number of old lithographs and prints made during the early history of the Aquarium Building, then called Castle Garden.

ZOOLOGICAL SOCIETY BULLETIN

No. 26

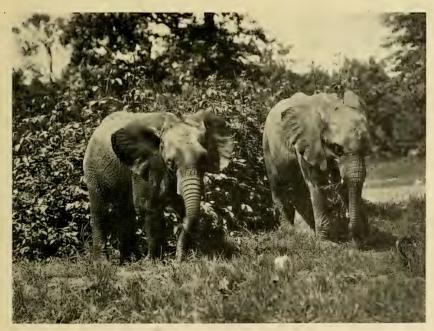
PUBLISHED BY THE NEW YORK ZOOLOGICAL SOCIETY

July, 1907

NEW AFRICAN ELEPHANTS.

I WAS about four years ago that we began our efforts to secure specimens of the colossal Sudan African Elephant, (*Elephas oxyotis*), of the Blue Nile country—the species which attains the largest size, and grows ears of enormous area. By a curious turn of fortune, the first elephant to come to us from Africa was one which represented the small-sized and small-eared West African species, known as *Elephas cyclotis*, which in captivity is exceedingly rare.

At last, on June 25th, there arrived at the Zoological Park a fine young pair of Sudan elephants. They came by way of Hamburg and Carl Hagenbeck, and have been nearly three months in transit. Both animals are in fine condition, and may justly be regarded as a notable accession. At present they are about two and one-half years old, with six months seniority in favor of the male. The male is four feet nine and one-half inches in height at the shoulders, and weighs 1225



THE NEW AFRICAN ELEPHANTS, KARTOOM AND SULTANA.

pounds, the female four feet eight inches, weighing 1080 pounds. At present the tusks of the male project only three inches beyond the lip, and those of the female are even smaller. The male is particularly well proportioned, and has the deep chest and muscular forelegs which mark a high-caste elephant.

Naturally, in the ears of Sudan elephants we expect much; and these are perfectly satisfactory. Those of the male are particularly enormous. They overlap each other on the neck, they cover almost the entire shoulder, they descend to a point three inches below the lower line of the jaw, and both are without a

In view of the fine qualities of the male specimen, and the great future that seems to be in store for him, he has been named "Kartoom," while the female has been christened

"Sultana."

Incidentally it may be added that they are vet to be paid for, and therein lies a fine opportunity for the making of two grand gifts, each in the sum of \$2500, wherewith to pay for these animals. To-day their cost is very reasonable. 'In a few years they will be the most gigantic and awe-inspiring beasts in Greater New York, and eventually they will be worth at least \$8000 each. If no ill fortune should befall Kartoom, he should attain a shoulder height of eleven feet and a weight of 12,000 pounds. Such a gift would do credit to any donor, and he will be accredited to the first person who sends \$2500 as his pur-His mate costs the same chase money. amount, and is equally eligible.

AN IMPORTANT EDUCATIONAL COLLECTION.

FROM the standpoint of teaching young pupils the rudiments of the classification of mammals, the Small-Mammal House has become the most important building in the Park. In arranging the collection in this building it was realized the considerable number of Orders of Mammals represented, and at once it seemed desirable to increase the number of Orders by a judicious selection of characteristic species. Naturally, the next step was to so label the collection as to make it a helpful center for teachers and classes in viewing various mammals grouped collectively. With the Small-Mammal House once fully

with the Small-Mammal Flouse once thily stocked, a condition brought about a year ago, the first step in gaining the desired result was to arrange the specimens in the form of a syn-

optic collection. New labels were prepared, each having a band of color at the top, thus: Gray—Primates; Red—Carnivora; Blue—Rodentia; Green—Edentala; etc. In conjunction with the labels, a large key-label was painted and hung at each end of the building, fully explaining the system employed. To further aid the understanding of the younger students, long labels bearing the respective bands of color, and the name of each order, were hung in parts of the building over the living specimens representing them.

Our next step in increasing the educational value of the Small-Mammal House will be to prepare a large wall chart showing in simple terms the classification of mammals. This work goes hand in hand with the popular lectures delivered to the school children. Fortunately, our ideas in labeling were matured, and the labels all in place, when the request to deliver lectures to the children of the Public

Schools was finally considered.

Not alone are these labels both striking and instructive; but they impart a well-finished aspect to both the interior and exterior of the building, adding an element of value to a miscellaneous collection of mammals that really forms one of our most important installations—and also one of the most difficult to

keep in good condition.

At the present time six Orders of Mammals are represented in the Small-Mammal House. These are the *Primates, Carnivora, Rodentia, Ungulata, Marsupialia* and *Edentata*. During the summer we shall endeavor to establish cages of bats, harbor seals and hedge-hogs, thus representing the Orders *Chiroptera, Pinnipedia* and *Insectivora*. From the keen interest thus far manifested, we anticipate that the contents of this building will be very helpful to teachers and students of Natural History, generally.

R. L. D.

THE ITALIAN GARDEN OF BAIRD COURT.

In THE center of the north end of Baird Court there is a rectangular plot of ground, with an area of eighty-five hundred square feet. From the broad terrace connecting the first landings of the two main stairways, it rises with a grade of a little over ten per cent., to the level of Baird Court. It is flanked on either side by flights of steps with highly ornamental balustrades of limestone and terracotta, and forms, with these steps, the connecting link between Baird Court and the Grand Concourse, now under construction.



THE ITALIAN GARDEN IN BAIRD COURT.

Three flights of broad steps on the south, east and west, lead into the garden proper, each being connected with the others, and also with the entrance in the center of the lower terrace, by grass walks, forming a cross within a diamond. This purely formal treatment of the garden was demanded by the surrounding cut-stone work, and indeed it is the only one that could have given satisfaction in a situation such as this.

Of the eight triangular beds thus formed, those on the outside of the diamond are relied upon to give strength and character, and the four central ones have been planned to furnish color. To accomplish this idea, great masses of evergreens, from stately cedars, eighteen feet high, to trailing junipers of half as many inches, have been thickly planted, forming an irregular, serrated slope from the outside toward the center, and merging, so to say, into the box margins, with which all the walks are defined. These evergreens are of many sizes, forms, and hues, and compose groups, any one of which would make a brave showing, even if standing alone. Combined

as they are, they make a beautiful setting for the four flower-beds, which with their box edgings and bright masses of color, add to the garden another feature of interest and life.

It is the intention to have an uninterrupted display of flowers in these central beds, beginning with crocuses, tulips, and other early spring flowering bulbs, and continuing through summer bedding-plants, to late asters and dwarf chrysanthemums. For this season the beds have been planted with a double geranium of a glowing dark red color, named the S. A. Nutt. These bedding-plants will be supplied by our own nursery green-houses at Bronxdale.

Of evergreens, five hundred were used, consisting of such varieties as red cedars, green and gold Japanese cypresses, mugho pine, various dwarf arborvitæs and yews, a number of junipers and the small-leaved Japanese holly. Thirty-two hundred twelve-inch box bushes were used for the edgings, and in the flower beds eighteen hundred geraniums were planted.

H. W. M.

RAIDING A RATTLESNAKES' DEN.

FIRST-KEEPER SNYDER of the Reptile House and Mr. DeLos Hicok have just returned from an expedition, involving lively work and considerable danger, to the boundary line between Massachusetts and New York. The purpose of the trip was to secure a cageful of specimens of the banded or timber rattlesnake, the only species of rattlesnake found in this portion of the United States. The result of this expedition, despite unfavorable weather, is an exhibit of eighteen fine rattlers, all captured within three days' time.

In line with our aim to stock the Reptile House with a liberal number of representatives of the North American serpents, it was determined that the local species of poisonous snakes, the rattlesnake and the copperhead snake, should be well represented. It was decided to construct in one of our larger cages a high section of rock-work with several ledges, and in this cage to display a number of timber rattlesnakes. To make that kind of an exhibit attractive a considerable number of snakes was needed. Though we had made repeated efforts to buy timber rattlesnakes, our success had been unsatisfactory. Hence the special expedition to the Taconic Mountains, to a "den" from which we have obtained rattlesnakes once before.

Three years ago, Mr. DeLos Hicok, a civil engineer who is much interested in serpents, called at the Reptile House and informed the writer that surveyors working along the Massachusetts-New York boundary, where it passes through the Taconic Mountains, had been both hampered and alarmed by encountering numerous rattlesnakes. Acting upon Mr. Hicok's suggestion for an experienced man to accompany him in making an investigation, the writer dispatched Keeper Snyder, of the Reptile House staff. Investigation revealed the fact that the state boundary runs parallel with extensive rock-ledges and stoneslides. Following up the ledges on the Massachusetts side of the line, the investigators came upon rock formation so seamed, fissured and strewn with flat fragments as to offer ideal wintering quarters for snakes. It being spring, the "den" was well inhabited. Eleven large snakes were captured alive. A considerable number were seen to glide into sheltering crevices, while the search elicited a sonorous and steady rattling from fissures of indefinite depth.

The specimens obtained by this first expedition were exhibited in the Reptile House, where they thrived for nearly two years, after which a number of them died from a parasitic infection. This year's expedition was more carefully planned, as the route lay direct to the "den," without the necessity of discovering it. The start was to have been made early in May, but the unseasonable and prolonged cold weather seemed likely to keep the snakes below ground. It was not until May 15th that Messrs. Snyder and Hicok started for the "den."

When they arrived they found one condition much against them. In spite of the cool weather, the undergrowth had sprung luxuriously into leaf, making the search for serpents not only exceedingly difficult but dangerous. In breaking through the tangled mass, Mr. Snyder explains that he took desperate chances of being bitten. Hidden snakes suddenly buzzed almost from under his feet. When the men reached the ledges, or open ground, they found the snakes exhibiting a peculiar degree of caution. They were either coiled close to the edges of heavy undergrowth or at the mouths of deep clefts in the rocks. And they were quick to take advantage of cover, gliding into thickets or among rocks as soon as the human intruders came into view. The trail of most of the specimens could be followed by the whirr of their rattles.

Mr. Snyder says that the fissures on the ledges must extend inward for great distances, as the rattle of an escaping snake could be heard to grow gradually fainter until, barely distinguishable, it continued its tireless monotone, the owner evidently having drawn itself into an angry coil in some distant subterraneous retreat.

Several groups of snakes were found coiled in the sunshine, displaying a really sociable spirit. From each of these groups, however, the catch was seldom more than two. After a quick decision by the collector, and an assault on the specimens chosen, the other snakes lost no time in beating a retreat. From one group of five individuals but a single example was obtained, a fine sulphur-colored rattler that fought viciously, grinding its fangs against the stick used to hold its body to the ground, and finally biting itself in an hysterical exhibition of rage.

After two days spent on the ledge Messrs. Snyder and Hicok succeeded in capturing eighteen large rattlesnakes. Some of these are marked by a rich, sulphur-yellow coloration, while a few are jet black. The largest specimen is five feet long and two inches in diameter at the thickest part of the body. Its rattle is made up of thirteen segments.



THE RARE STILOSOMA EXTENUATUM.

All of the snakes were caught by pinning the head to the ground under a curved stick, after which the reptile was picked up by the neck—by hand—and dropped into a canvas bag. The entire catch is now on exhibition in one of the large cages on the main floor of the Reptile House.

R. L. D.

A RARE FLORIDA SNAKE.

MONG the North American reptiles there are several strikingly distinct species of serpents, each represented in the collections of all our museums by a total of from one to, possibly, six specimens only. With several of these, however, the apparent scarcity of examples may be traced to the inaccessibility of the habitat. There are several localities in the southwestern portion of the United States, which, if well worked by systematic collectors, would undoubtedly yield an interesting harvest of these supposedly rare creatures.

We have an exception to the conditions cited, in a small snake known technically as Stilosoma extenuatum. This reptile was originally described by Mr. Arthur Erwin Brown, Director of the Zoological Gardens, in Philadelphia. The original description was made in 1890, and the type specimens were taken in a part of Florida (Marion and Orange Counties), well investigated by collectors. Yet, since that time, the total number of specimens known to have reached museum collection has been only ten. Mr. Brown explains the distribution of these specimens as follows: Seven specimens are in Philadelphia, in the Academy of Sciences and Mr. Brown's collec-

tion, one is in the National Museum, another is in the British Museum and another probably is in the museum at Upsala, Sweden.

In a shipment of snakes from Orlando, Florida, received a month ago at the Reptile House, two specimens of the rare Stilosoma extenuatum were discovered. They are apparently mature, and in perfectly healthy condition. Owing to their degenerate make-up, this being especially evident by their small eyes and the simplified scalation of the head, they were placed in a cage containing a layer of wood pulp, affording them a medium in which to burrow. They appeared continually uneasy and very active, boring their way out of sight to soon reappear some distance away, when they would ascend the branches of a small bush within the cage with a suppleness of motion surprising for burrowing reptilesyet natural enough owing to their strangely elongated bodies. When handled these little snakes show none of the stiffness usually characteristic of burrowing serpents, but coil about one's fingers, or draw the body into a compact Such actions point to powers of constriction, and may enable the species to overpower and eat other small snakes, such as Diadophis, Cemophora, Virginia and Haldea, as well as the ground lizard, Lygosoma. Thus far neither specimen has been induced to feed. Both appear strikingly similar in coloration to very young specimens of the corn snake, Coluber guttatus, for which they were for a moment mistaken, as the writer went hurriedly over the contents of the shipment. In distributing the various reptiles composing the shipments, the writer was attracted by the small heads of the present specimens, and an examination at once disclosed their identity.

R. L. D.

BOBBING FOR EELS.

DOBBING for eels commences about the middle of April in the vicinity of New York. Eels are generally out of the mud by that time, roaming over the flats looking for food, being very hungry after their long winter hibernation. They afford good sport for those who know how to get it, and this is the method of procedure: The "bobber" digs a quart of sandworms out of the "flats" at low tide, which he strings on linen thread with a long needle, running it through the entire length of each worm. After the thread, which is ten or fifteen feet long, is full of worms, and the ends are secured, it is wound around the hand, forming a "hank," through which a fish-

ing line is passed and secured. Thread is then wound around the hank, securing it in a compact bunch four or five inches long and two or three inches thick. This makes the "bob,"

Eel bobbing may be done anywhere about the shores of New York Bay in water five or six feet deep, or in fact over the very sandfats from which the worms were obtained. The time for fishing is from the first of the floodtide to high-water. After the boat is anchored, the "bob," with a two-ounce sinker attached, is dropped overboard and kept close to the bottom by sounding. If eels are about, the fun will commence immediately.

The eels seize the "bob" and hang on until they are lifted into the boat. The thread wound about the "bob" holds it together a long time. Sometimes four or five eels are lifted from the water at once, and a bobber may catch a bushel of them, varying in size from

six inches to two feet, at one tide.

Bobbing for eels is wet work, and it is well for the fisherman to wear oilskin overalls and rubber boots. A low boat is best, as the eels

do not hang to the "bob" very long.

Bobbing is also done from the shore with a fishing-rod, the eels being thrown out onto the bank. Then the spectators have the fun of seeing the bobber catch the slippery creatures and put them in the basket. Half of those tossed ashore may wriggle into the water before they are captured.

Eel-bobbing parties are often formed in localities where eels abound and the sport is lively. The best time to bob for eels is at night, but good catches are also made by day.

-From the notes of W. J. De Nyse.

THE CENTENIAL OF THE AQUARIUM.

N THE evening of May 23 a reception was given at the Aquarium by the New York Zoological Society, to the New York Academy of Sciences, in commemoration of the two hundredth anniversary of the birth of Linnaeus. Advantage was taken of this occasion to celebrate the centennial of the Aquarium building, the construction of which was begun in 1807.

Additional electric lights having been put in the building, the first view was afforded of the collections by night, 450 guests viewing the novel spectacle. The Aquarium was decorated with many plants and Japanese lanterns and a large orchestra was provided. The palms and other plants were kindly supplied for the evening by the Department of Parks through Commissioner Moses Herrman.

The Aquarium building lends itself admirably to decoration, and many expressions of approval were heard from visitors. In view of this fact it may be desirable to hold future meetings of the Zoological Society in the building, and the Executive Committee is considering the advisability of opening the Aquarium to the public on two or more evenings of each week.

THE JUNGLE WALK AND BRONX-DALE ENTRANCE:

ISITORS to the Zoological Park will find open to them a new walk leading through a particularly beautiful tract of virgin forest, and also a new entrance. Heretofore, the area situated between the Beaver Pond and Lake Agassiz, and formerly called the beech woods, has not been open to the public. for the reason that improvements around the Bronxdale entrance were not completed. Now, however, the walk along the river from that entrance up to the Beaver Pond, has been finished. On Sunday, June 8th, the new entrance at the Bronx River Bridge on the Boston Road, and known as the Bronxdale entrance, was opened to the public for the first time. It renders accessible to visitors the waterfall, Lake Agassiz, and the most beautiful woods in the whole Zoological Park.

With infinite pains, a board walk has been constructed through the virgin forest, between Lake Agassiz and the Beaver Pond, without in the slightest degree disturbing the tree roots and the ground along its borders. In order to avoid the destructiveness of teaming through those woods, all the materials for the board walk were run in by hand, and not one team has ever passed over that course. The natural beauties of the forest have been most jealously preserved, and every lover of nature will be delighted with the untouched condition of the beech forest, and the beauty of the ferns, mosses and wild flowers which em-

bellish the earth on every side.

The brook coming down from the Beaver Pond constitutes a pleasing feature. This tract of forest has been named "The Jungle," and the walk leading through it is called "The Jungle Walk." Lake Agassiz, the waterfall and the glen below them must be seen to be appreciated, and those who love the quiet seclusion of an untouched forest, as found in spring, will undoubtedly find this region a charming resort. Seats have been placed along the Jungle Walk, and they are well patronized. Of course the public is not per-



A BIT OF LAKE AGASSIZ FROM THE JUNGLE WALK.

mitted to wander through the woods, away from the walk, to the destruction of the delicate forest plants that, when once trampled into the earth, never can be renewed.

As soon as possible a small rustic bridge will be thrown across from the main shore to

the island that divides the southern fall, in order that visitors may obtain a fine view of the falls as a whole.

The Bronxdale entrance will be kept open each year from May 1st to November 1st, but in winter it will probably be closed.

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A STATE BISON HERD.

The initial effort of the officers of the American Bison Society to bring about the establishment of a state herd of American bison, to be permanently located on state lands, and owned and maintained by the state of New York, has been thwarted. The bill New York, has been thwarted. introduced and vigorously pushed by Assemblyman Frank H. Hooper was by Senator Armstrong kindly translated into an item of the annual supply bill, where it met the approval of Speaker Wadsworth, Assemblyman Moreland, Chairman of the Assembly Committee on Ways and Means, and all the members of the Conference Committee. It is a pleasing fact that the measure encountered no determined opposition, and all the leading Senators and Assemblymen have cordially favored it. The only necessity for the strenuous efforts in behalf of this measure that were put forth by Professor Franklin W. Hooper and the President of the Bison Society, ably assisted by Mr. Harry V. Radford, was by reason of the fact that the initial appropriation necessary is \$20,000, and there were calls for state money beyond the amount available.

For a time it seemed that the proposed bison herd was desired by every citizen of this state. The item passed both houses of the legislature. practically by unanimous consent, and went to Governor Hughes in the supply bill. Without the slightest warning, and to the profound surprise of everyone, Governor Hughes picked out the item for the state bison herd, and vetoed it.

WICHITA BUFFALO RANGE.

We are advised by the Bureau of Forestry, of the Department of Agriculture, that the fulfilment of the contract for the erection of the fences, corrals, barn and sheds of the Wichita Buffalo Range has been satisfactorily carried out. By July 15th, the work will be completed, and the range will be ready. For several excellent reasons, it is not best to send the herd southward in midsummer, but at the earliest satisfactory date the shipment will be made. It is the opinion of those most interested that October will be the best month for the transfer of the nucleus herd, and arrangements will be made accordingly.

THE ZOOLOGICAL CONGRESS.

Every two years the zoologists of Europe and America meet in an International Con-One week is devoted to a series of meetings embracing fifteen sections, or branches, of zoological work and interest. These sections cover the whole range of human activity as concerned with animate nature, and they also cover the zoology of all extinct forms of life. During past years, sessions of the International Congress have been held, as follows: Paris, 1889; Moscow, 1892; Lyden, 1895; Cambridge, 1898; Berlin, 1901; and Berne, 1904.

At Berne, the Congress received an invitation from the zoologists of America to hold its seventh session in Boston, in 1907. That invitation was accepted, and the Congress will convene in Boston on August 19th. It will close its sessions there on August 23d, and after that date, both the American and foreign members will journey to Woods Holl, New York, Philadelphia and Washington. To New York City and vicinity will be devoted the entire week beginning on Monday, August 26th. Thursday, August 29th, has been specially set apart as "The New York Zoological Society Day," and on that date, the members of the Congress will visit the New York Zoological Park and Aquarium.

Up to this date sixty distinguished foreign zoologists have registered as members of the Congress, and expressed their intention to attend. The number of American guests will probably reach 200. Naturally, the visit of the Congress to New York is of interest to all persons who in any way are connected with the zoological institutions of this City, and the zoologists of New York have formed a local committee to provide for the entertainment of the members of the Congress during their visit here.

THE AUTOMATIC SHOT-GUN.

Mr. G. O. Shields and his supporters in the campaign against the automatic gun have won a victory in an important engagement. The State of Pennsylvania has recently enacted a law, and it has been signed by the Governor, prohibiting in hunting the use not only of the automatic shot-gun, but also of the well-known "pump-gun" which has been in use for several years. The battle was fought hard on both sides, but the longer the subject was illuminated the stronger grew the feeling that automatic guns of all kinds should no longer be used against wild life; and the final majority was overwhelmingly against those weapons.

At first Governor Stuart was inclined against the measure, but the arguments against the deadliest guns soon convinced him that the interests of wild-life preservation warranted his approval of it; so he signed it, and sent the pen to Mr. Shields, to hang alongside the one with which President McKinley signed the admirable "Lacey Bird Law."

Seven of the provinces of Canada have enacted laws against the automatic gun, but it was left to Pennsylvania to show the way to other states on this side of the international boundary. All honor to Pennsylvania, and the grand army of her citizens who worked for and voted for the new measure, and to the Governor who signed the bill. We congratulate Mr. Shields upon this signal testimonial to the correctness of his judgment regarding the mechanical shot-guns.

THE ELEPHANT HOUSE SCULPTURE COMPETITION.

In response to the request of several sculptors of wild animals the work involved in providing the animal sculptures for the Elephant House, was thrown open to competition. After a careful consideration of the

whole subject, the Executive Committee decided to invite six sculptors to compete, and a suitable amount was appropriated for the expenses of each competitor. The following persons were invited to compete: A. P. Proctor, Eli Harvey, F. G. R. Roth, Miss Anna V. Hyatt, Charles R. Knight and B. C. Rumsey. Owing to her departure for a prolonged stay in Europe, Miss Hyatt was unable to enter the competition.

The models of the five competitors were delivered on Saturday, June 8th, at the Lion House, and were displayed in the studio of that building, where the light was well adapted to the purposes of the occasion. All models were submitted without signature or sign save a distinguishing mark, under seal. In entire ignorance of the origin of any of the models, the Executive Committee of the Society made its official inspection at a special meeting held at the Zoological Park on June 19. The decision was awarded to the models which it was presently discovered were submitted by Mr. Proctor and Mr. Knight; and finding it extremely difficult to choose between these two sculptors, the work was divided, and one-half of it awarded to each.

THE LION HOUSE MURAL DECORATIONS.

For a considerable period the six smaller outside cages of the Lion House have lacked their mural decorations. The three large cages were so successfully decorated, by Mr. Carl Rungius, the well-known painter of wild animals, that the completion of the original scheme has only awaited a reasonably convenient season.

At no small sacrifice to his own plans and work, and solely because of his keen interest in the general work of the Zoological Society, of which he has long been a member, Mr. Rungius has taken time to complete the original design. During the spring months, with excellent assistance from Mr. E. A. Costain, of the Zoological Park force, he decorated the rear walls and all partitions of the six smaller cages, and brought the whole work together in one continuous panorama, stretching from end to end of the outside cages.

As the members of the Society already know, the combination of rocks and painted background behind them in the three large cages proved an unqualified success, but the completion of the scheme has more than doubled the effectiveness of the three isolated panoramas.



A PORTION OF BRONX LAKE NEAR THE NEW BOAT-HOUSE.

LECTURES TO SCHOOL PUPILS.

AST April, in response to urgent appeals from the Bronx Borough Teachers' Association, represented by Professor Hugo Newman, and many other teachers of the Borough of the Bronx, the Zoological Park staff hurriedly converted the Shelter Pavilion, at the Wolf Dens, into a lecture hall, and prepared a course of illustrated lectures. Director of the Park delivered a series of lectures entitled "An Introduction to the Study of Mammals," Curator C. William Beebe lectured in a similar vein on the bird world, and Curator Raymond L. Ditmars lectured on the four Orders of Reptiles. A good stereopticon was purchased and operated by Mr. Sanborn, and Chief Clerk Mitchell provided the black drop-curtains by means of which the pavilion was darkened.

The teachers of the Bronx Borough Teachers' Association vigorously undertook their share of the work. They printed and distributed to teachers a very complete syllabus of each lecture, secured the services of about twenty teachers to act as demonstrators, and arranged a program by which forty different schools of Bronx Borough were allowed to send delegations of children from their 5A grades. It was reported that more than twice as many children applied for the privilege as could be accommodated.

At each lecture, about 400 children and twenty teachers were present, filling the makeshift lecture hall to the limit of its seating capacity. Each delegation was conducted by its own teacher, and the universal promptness of arrival at the hall was very noteworthy. The most perfect discipline was maintained throughout and Professor Newman impressed upon the minds of the children the important fact that the whole afternoon's work represented regular school exercises, as prescribed by the Board of Education. He said, "You are to remember that you are now actually in school, and under all the rules that apply to attendance in your respective public school buildings."

The ages of the pupils were supposed to range from eleven to thirteen years; but a great many of the children were so small that they seemed to be younger than nine. They were all so bright-looking, so alert, so neat in

dress and so eager to know about animals that it was a pleasure to talk to them. Throughout the whole course of lectures there never was the least disorder, or break in discipline, and each lecture was listened to with close attention.

Naturally, the subject matter of the lectures, and the illustrations, were most carefully chosen to meet the age and understanding of the pupils, and to set forth only facts which could be understood and remembered. At the close of each lecture, the classes were taken out in sections, with about fifty pupils in each section, and guided to the living creatures which specially illustrated the lecture. On reaching each collection, a demonstrator pointed out the specimens of special interest to the pupils.

It is not going too far to say that by the teachers, principals and district superintendents who either saw this work in progress, or participated in it, the experiment was pronounced an unqualified success. An earnest appeal has been made to the Zoological Society that it provide a permanent lecture hall in the Zoological Park, capable of seating 1,000 school children, in order that the children of Manhattan may enjoy the privilege of practical zoological instruction in the Park that now is available only to those of Bronx Borough.

THE BATELEUR EAGLE.

THERE is now living in the collection of the birds of prey a splendid specimen of the bateleur eagle. This bird is remarkable for its magnificent bearing, the brilliant uneaglelike colors of its plumage and its absurdly short tail. It is found over the greater part of the African continent, south of the Sahara, and is especially characteristic of the southern part.

The long crest adds much to its martial appearance, and this, together with the head, sides of the neck and the under parts, are glossy-black. The back, tail-coverts and tail are rich maroon-chestnut, while the shoulders and most of the wing-coverts are of a silvery hue. The flight feathers are black and the beak is parti-colored yellow, orange and black, while the feet and legs are bright coral-red. Although the bird measures a full two feet in length, yet the tail is only four and a quarter inches long, producing the effect of a bird with a tail only partly grown out.

The French name bateleur, synonymous with the terms harlequin and mountebank, was

given to this eagle because of its curious and inexplicable habit of turning somersaults in mid-air. It also occasionally swings from side to side while in full flight, with the wings rigid and held slantingly upward. To complete the tale of its remarkable aerial habits, when hunting for prey, instead of watching the ground before or immediately beneath it, the bird draws its head downward and close to the body, apparently looking backward between its legs to the ground over which it has passed.

The diet consists of small reptiles and mammals, and this eagle feeds frequently on carrion in company with the true vultures. It is said to attack poultry, but a specimen which was kept in a henhouse did no damage except to devour some of the eggs. A nest of sticks is built near the top of some high and thorny acacia where the large creamy-white egg is laid.

C. W. B.

NESTING OF THE BIRDS IN THE COLLECTION.

AINY and cold though the spring has been, many birds in the collection have nested. The sand-hill cranes built their nest and laid two eggs as usual, and the mallard ducks began to incubate almost before the frost was out of the ground. There were seventeen of their nests around the Wild-Fowl Pond alone, although so well hidden that they were invisible until the sitting bird was flushed. Many broods of ducklings of various ages are now on the several ponds and foraging for themselves among the grass. As usual, on the appearance of the first broods, a crow or two developed a sudden fancy for ducklings and six or eight unfortunate youngsters were carried away before the black marauders were Soon afterward a stray cat was shot while stalking a brood, but since that time no enemy has interfered with the young mallards.

The griffon vulture laid a large white egg in the corner of her cage and savagely resented its removal. The brown pelican, white-breasted guan, Egyptian goose and Himalayan jay-thrush laid eggs for the first time, but none of these built nests.

Considerable excitement was caused one day in the big central flying cage of the bird house by the sudden appearance of a young saffron finch. When first observed it was squatting on the sand with an admiring, or at least interested, circle of birds—terns, quails, pigeons, gallinules, larks and orioles—gathered about it. Where it had been reared was for a long

time a mystery, but when it was old enough to care for itself the secret was discovered, as the parents built a second nest deep within one

of the old crowns of a palm tree.

At the present time a half dozen species of doves and pigeons are sitting on their eggs, while the young of bluebirds and robins are already hatched. There are seven robins' nests in one cage, a fact which leaves little doubt as to their happiness and contentment. Although these birds were all nestlings when placed in the collection last year yet their first attempts at nest-building, far from being awkward or abortive, have resulted in wellthatched, mud-lined structures, strong and well built. Common as is our robin, its entire history is far from thoroughly worked out, and here, where the nest-building, laying and incubation is all accomplished within a yard of the cage wires, a wonderful opportunity is afforded for careful observation at close range. Pans of mud are provided and the robins may be seen filling their beaks with this soft black building material, carrying it to the halffinished nest and molding it into shape with beak and breast.

On cold days the parent sits so close that only her head and tail are visible above the rim of the nest, while on hot days she half stands with partly lifted wings, as a shield

against the intense heat of mid-day.

In another cage a grackle is sitting on a great bristling mass of straw and twigs, whose outside gives no hint of the smooth interior which holds the beautifully marked eggs. A European wood pigeon has the flimsiest nest of all, merely a handful of straws, laid one over the other in a crotch. How her two white eggs manage to stay on is a miracle. A yellow-billed cuckoo sitting on three eggs is an interesting sight, as this bird has never before been known to lay in captivity. In another corner of the cage are six others which she has laid. A white peahen is incubating a half dozen eggs, and rarest of all, a pair of trumpeter swans has built a nest on an island in the Beaver Pond. These birds are all but extinct, and if they succeed in rearing young it will be a notable event.

AMERICAN WOOD WARBLERS IN THE LARGE BIRD-HOUSE.

THE American wood warblers, (Mniotil-tidae), are perhaps the most interesting of our smaller native birds. There are about 155 species all told, ranging from Alaska and Labrador south to Argentina. Of

these, fifty-five species and nineteen subspecies are found within the borders of the United States. Every spring our woods and groves are thronged with these brilliantplumaged little birds, whose colors reveal a great variety in hue and in pattern. In spite of their name, they do not take high rank as vocalists, their warbling, as a rule, being monotonous and of limited musical range.

Some species linger through the summer and nest with us, but the majority push on to the coniferous forests of the northern States and Canada. In the fall they return southward, some in entirely altered attire, the young birds frequently exhibiting still another pattern of colors. They thus tax to the utmost the skill of the amateur ornithologist, delighting him with their colors and simple ditties, and yet confusing him by their very numbers. Every aid to their identification is welcome. Mr. Frank M. Chapman has recently published a book, illustrated with many colored plates, devoted solely to this Family of birds, which will be of great value when used with the field-glass and notebook.

But better than either books or pictures can be, are the living birds themselves; and in the Large Bird-House of the Zoological Park there is, without doubt, the finest collection of live American warblers which has ever been gathered together. These birds are all insect feeders, and as such, are most difficult to keep in health in confinement. It is safe to say that the ordinary canary lover could not keep one of these birds alive for forty-eight hours. By means of most careful study of the habits and food of the birds, and by continually experimenting with diet, and ways and means for accustoming these delicate little birds to their new conditions of life, Keepers Stacey and Durbin have assembled and established a collection of no less than eighteen species. These include all of the common, and also some of the rarest, forms found near New York City, either as summer residents or as transient migratory visitors in spring and fall.

The warblers which have been in the collection for two or more years have passed through their annual moult on time, and as thoroughly as if in a state of freedom; so there seems no reason why they should not all live out their span of life—indeed, a much longer span than would be theirs if exposed to the vicissitudes of their wild life.

So varied are the eighteen species that all of the interesting adaptations of the Family are represented, radiations from the typical wood warbler, arboreal, seeking food under



AUDUBON COURT, TAKEN FROM THE MAMMAL HOUSE.

The elliptical plot in the center is filled with a profusion of rhododendrons and mountain laurel, forming one of the most pleasing features of plant life in the Park.

leaves and on the twigs of the higher trees, toward specialization as creepers, flycatchers, marsh-haunters, and, strangest of all, toward a sandpiper life.

Eight of the species in the collection are among those which remain to nest near our city, more or less commonly as the case may be. Perhaps the best known of these in the spring is the yellow warbler, or wild canary, as it is called from its color. This is the bird which is so often imposed on by parasitic cowbirds, and which sometimes builds a second or even a third story to its nest to avoid hatching the parasitic egg. Of different pattern of plumage, but almost as conspicuous, is the American redstart—a warbler with the habits and actions of a flycatcher, dashing through the trees in rich orange and black dress, in pursuit of flying insects.

Near the stream borders or marshy places we are almost sure to hear the Witchity! Witchity! Witchity! of the northern yellow-

throat, with its wren-like actions and black mask over its eyes. In the collection it is one of the most active of all the warblers, running about on the ground, or flying from branch to branch. The blue-winged is represented by a number of specimens, and the well-named black-and-white creeping warblers are forever going up and down the tree-trunks and branches in their cage.

A pair of worm-eating warblers, with handsomely streaked heads, will be a new sight for many amateur bird-lovers, for these birds are far from common, and their prompt acceptance of the conditions of confinement, and their tameness, is very fortunate. The ovenbird and Louisiana water-thrushes are the last of the resident species, and stand for the most aberrant type, one which has actually taken to a life on the ground, a walking gait, a teetering motion, and a fondness for wading in the shallows of brooks. In fact, although true warblers, these have become, to all intents and purposes, sandpipers in appearance and in choice of haunts! The ovenbird is one of the easiest of our summer birds to identify by its song—a loud, ringing crescendo, sounding like TEACHER! TEACHER!

TEACHER! TEACHER!

Of the ten species of warblers living in the Large Bird-House which are only migrants with us, eight are more or less common. These are the northern parula, the black-throated blue and the black-throated green, the myrtle, the magnolia—perhaps the most beautiful of all, the blackpoll, the northern water-thrush—noted for its wild ringing song, and the dainty Canadian warbler, with a necklace of black beads upon its yellow breast.

These are all interesting, the more so, perhaps, because of the mystery which surrounds their nesting home, tiny air-castles built among the giant spruces and firs of the far north. The pine warbler is rather rare, but the gem of the whole collection is the mourning warbler. This is one of the latest of all the migrants, passing north in late May and early June, and never stopping with us more than a day or two, but seeking the wild regions of the cool mountains farther north. A day which brings the mourning warbler within range of our glasses is a red-letter one, indeed.

One of the easiest of these birds to identify in the field is the male black-throated blue, but the female is one of the most difficult. In her olive dress with a thin white line over the eve and a patch of similar color at the base of the primaries, she is as different as can be imagined from her blue, black and white spouse. But when one can watch the dullcolored female at arm's length, flying, feeding, bathing, for hours at a time, the faint characters of color and movement are readily learned. The usefulness of such a collection of warblers as ours is then apparent, and the facts will remain fixed in the mind much more certainly than if conned from a dried skin or from a written description, no matter how accurate the latter may be.

ZOOLOGICAL PARK NOTES.

Owing to the unseasonable and protracted cool weather, the outside Lizard and Tortoise Yards were not occupied until the first week in June. Then the doors were thrown open, and the various reptiles quartered in the eastern room of the Reptile House trooped forth to the open air and sunshine. Among the lizards there was a great amount of frisking and

dashing about. Later on, all the specimens indulged in "sun-baths," assuming the characteristic sprawling attitudes that point to a general contentment with their lot.

the state of

Our collection of anthropoid apes has been diminished by the death of "Dohong," the male orang-utan, who lived here four years; but the loss has been made good by the recent purchase, from Captain Percy Watson, of the steamer "Indrasahma," of another male orang of about the same size as "Dohong." newcomer has been named "Captain." hair is unusually long and thick, and of a rich. dark-red color. As seen in action he is exceedingly picturesque. At present he is suspicious of everybody, and it will be several weeks before any attempt can be made to learn his susceptibility to training. In addition to "Captain," the ape collection has acquired two small female orang-utans, and a small chimpanzee, named "August," who is exceedingly lively and droll. The latest arrival of all is a young bald-headed chimpanzee, (Pan pygmaeus), which has just been brought to us by Mr. Gustave Sebille from the small bit of territory north of the Congo that is known as Portuguese Congo. These additions bring the total number of our man-like apes up to seven, all of which are in excellent health.

In addition to the chimpanzee noted above, Mr. Sebille brought us a fine lot of white-nosed, mustache, patas and other monkeys belonging to the genus *Cercopithecus*. They make a striking and attractive exhibit.

* * *

The strange combination of an African meerkat and a ground squirrel living in the same cage in perfect harmony continues in the Small-Mammal House. Both of these animals were caught when very young, and were reared together. The meerkat is closely allied to the Indian mongoose and is by nature the deadly enemy of all small rodents. At feeding time, these little animals appear to become confused in their natural and respective diets. The squirrel may often be observed to eat raw meat, and the viverrine to paw over the vegetables that are supplied for its cagemate.

The big and richly-colored Indian squirrels, represented in the Small-Mammal House by the Malabar squirrel, the white-headed squirrel and the black Indian squirrel, are about as playful and amusing in their antics as monkeys. They stand upon their hind feet and box with each other, swing head downward from the branches in their cages, and go

through other agile manoeuvers. These handsome rodents are among the most docile, intelligent and hardy of our squirrels—a combination not always to be found among the showy tropical animals.

* * *

While referring to the squirrels it is interesting to note that our fourteen cages of these animals form an instructive display in the Small-Mammal House. Among the species exhibited are the following: Eastern chipmunk, western chipmunk, Parry's spermophile, Richardson's spermophile, red squirrel, goldenbellied squirrel, Columbian fire-backed squirrel, southern fox squirrel, white-nosed squirrel, Carolina gray squirrel, together with the black and the albino phases of the latter species. Among the Old World species are Prevost's squirrel, African striped squirrel, Malabær squirrel, white-headed squirrel and the Indian black squirrel.

A pair of large and lusty beavers has been placed on exhibition in an outside cage on the eastern side of the Small-Mammal House. The animals are supplied with a large tank and plenty of food-wood, and are thriving. While our examples in the Beaver Pond are seldom to be seen on account of their nocturnal habits, this is certainly not the case with the present specimens. They are continually about, and when annoyed rush for their tank, from which they send the water flying by violent blows from their broad, flat tails.

While the average spider monkey is a timid, delicate and generally unsatisfactory animal for exhibition, we have been fortunate in securing three exceptionally good examples of the black species, (Ateles ater). They are continually on the move, demonstrating the great value of the long, prehensile tail. Moreover, they are in the best of health, and on thoroughly satisfactory terms with their keepers, who carry them about in their arms in a fashion seldom possible, except with baby chimpanzees or orang-utans.

The leopard cubs and jaguar cub now quartered in the Small-Mammal House have attained a size to almost belie the name cub, and they will soon graduate from their present quarters to cages in the Lion House. The leopards are still as playful as kittens, but the jaguar, in keeping with the reputation of his species, is becoming savage and not to be trusted. The keepers have discontinued their practice of daily entering the jaguar's cage.

This specimen came from Central Mexico, as a gift from Mrs. Arthur Curtiss James, and if his very thick limbs and heavy head are typical indications, he promises to develop into a fine animal.

* * *

The amusing antics and fuzzy coats of the two European brown bear cubs have earned for them a warm spot in the hearts of our youthful visitors, who, as in duty bound, call them "Teddy Bears." They have a droll habit of strutting about on their hind feet and cuffing each other, besides doing a long series of other laughable tricks which only young bears can display. The mother is at all times watchful and suspicious, and wisely prevents them from spending too much time in close proximity to the visitors.

Rather an amusing incident occurred in the Park during the early part of June. The weather had been steadily cool with no hint of summer, when there came a sudden warm day and an incipient thunder shower. Without warning, there was a general chatter of treetoads. It seemed as if those lively little creatures had been patiently awaiting a warm rain, and when it came felt called upon to welcome it with prompt enthusiasm.

During the cool weather our Indian elephant was necessarily kept indoors, and felt much bored by the general postponement of the outdoor life. With few visitors from whom to beg, and nothing in particular to do, he turned his attention to the heavy plaster moulding or cornice work around the top of his stall. Rearing high on his hind legs, he succeeded in removing several sections, weighing about ten pounds each. A severe reprimand from his keeper stopped his tricks during the day, but one night his suppressed energy again broke loose, and he tore down a section of plaster as large as a man's head. He has since been punished for his wanton destructiveness, thus far with a satisfactory result.

Among recent arrivals in the Small-Mammal House is an exceptionally fine pair of Malabar squirrels. This East Indian species is the largest of all known squirrels. It is attractively colored and very docile. Another interesting rodent is a tailless tree-rat from Jamaica, while on the eastern side of the building, in an outside cage, is a pair of large and lusty beavers. Among the flesh-eating animals is a new clouded leopard from Singapore, a big ocelot from Texas, and a young



AMERICAN BISON CALVES BORN IN 1907.

Malayan paradoxure. On June 15 a very fine specimen of the rare and beautiful large-spotted genet, of South Africa, was brought to the Park and presented by Mrs. A. Venturini. This animal is a very agile climber, and at times is almost serpent-like in its movements.

Beaver Valley Walk between the Beaver Pond and Baird Court is now very beautiful. To pass over it in the morning hours, especially after a rainy night, is a particularly delightful incident. At such times, the air is heavy with the perfume of the forest, and the foliage is immaculately fresh. This is not the year for the universal flowering of the rhododendrons, but for all that many clumps of pink blossoms are to be seen. Up to date nearly all the rhododendrons have grown six inches, and the new leaves make the masses of dark green look as if they had been washed over with a lighter color. The beds of ferns along the brook are springing up handsomely, and are a delight to the eye.

No sooner was the Small-Deer House completed and turned over to the Society than it was filled with an odd mixture of small deer, antelope, mountain sheep and goats, which up to that time had been temporarily housed. The yards of the eastern series are now fully complete and occupied, and in another fortnight the animals in the western half of the building can be let out into the open.

* * *

The five Rocky Mountain goats continue in excellent health, notwithstanding the ragged and very unsatisfactory appearance they present during their shedding period. The glands behind their horns began to appear in January, and on July I they were quite large. They have grown satisfactorily, and from their general vigor we are led to hope that they will breed next year. Although they properly belong on Mountain Sheep Hill, their present quarters, near the Pheasant Aviary, seem so perfectly adapted to their wants, it is inadvisable to move them.

Special Number

For the Visit of the Seventh International Zoological Congress, 1907*

ZOOLOGICAL SOCIETY BULLETIN

No. 27

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ZOOLOGY IN NEW YORK.

SCIENCE follows in the wake of Commerce. Having long ago reached commercial supremacy in the western hemisphere, the City of New York is now developing as a scientific center. Its progress in the last fifteen years has been remarkable. In respect to its enlightened and liberal system of support of public institutions of science and art it is now one of the leading cities of the world. Although supported by the city alone, its institutions begin to compare favorably with the

great state institutions of Great Britain, France, Germany and Belgium.

There has been especially developed here a system with four great features, namely: maintenance by taxation, free admission of the public, management by committees of citizens entirely independent of the politics of city government, and munificent private gifts.

The Museums of Art and of Natural History, the Zoological Park and the Aquarium are all built and maintained at public expense,



POLAR BEAR DEN IN THE NEW YORK ZOOLOGICAL PARK.

^{*} Prepared by C. H. Townsend.

but enjoy the benefits of non-political administration and of almost boundless liberality in the matter of gifts, such as becomes a city of rich merchants and men of affairs. The city buys no specimens for its natural history museums, no animals for its zoological parks, no works of art for its galleries—these are all the personal gifts of its citizens.

In connection with the visit of the International Congress of Zoology it is interesting to show how an almost ideal interrelationship between the public and private institutions is being established, how the most advanced researches and instruction of the university are related by a graded system to the earliest steps in popular education, how the public school system, with its 600,000 pupils, is taking advantage of the rare opportunities for nature study which the museums, zoological park,

and Aquarium afford.

The Universities, entirely supported by the gifts of citizens without any aid from the city or state, are the centers of pure research, and of the training not only of university, but of high school teachers. They are, to a certain extent, also engaged in exploration and in the administration of special departments in the museums and in seashore laboratories. They take advantage of all the research and teaching opportunities afforded by the museums, the zoological park and the aquarium. Their staffs take some part in the system of public free lectures which are given throughout the city under the Board of Education.

The Museums, supported by public and private funds, have taken the function of the collection and exhibition of specimens in all branches of natural history. The American Museum is the center of active research and publication. It sends expeditions to explore in all parts of the world. The halls are open for nature study classes from the high schools. Special courses of lectures are given to students from the grammar and high schools. Conveyed by an electric vehicle small traveling museums are sent to schools in all parts of

the city.

The Museum of the Brooklyn Institute is also active in research and publication and maintains extensive zoological exhibits.

The Zoological Park is a great popular resort, also the center both of research and more serious popular education. The publications of the Director and the chief curators, who are all scientific men, touch all branches of the natural history of the field. Courses of free lectures are given to great numbers of school children to enable them better to understand

the relation of the animals in the park to

systematic zoology.

The Aquarium is also a great popular resort. It administers to the public school system by distributing well regulated aquaria to more than 150 schools, and by opening its laboratory to classes of pupils. Its laboratory is also open to investigators in experimental zoology, in fish embryology and in the habits of fishes.

The Public and High School system of the city under the Board of Public Education is rapidly extending its connection with the museums, zoological park and the aquarium. It is estimated that 500,000 youths and children took nature study courses during the past year. Ninety-one thousand children attended special lectures in the American Museum in the year 1906. The system of visiting the museum, aquarium and the zoological park under the direction of teachers is rapidly extending. The nature work in many of the high schools is directed by men who have taken their doctorates at the university. The Board of Education also conducts courses of free lectures, chiefly of a scientific character, in all parts of the city.

This special number of the Zoological Bulletin is designed to set forth briefly some of these features of the city life. They show that New York does not deserve its reputation of being a badly governed city, that its citizens are alive to their responsibilities, that its public officials thoroughly believe in popular education, that the enormous foreign population which comes to this port enjoys advantages of free and attractive education as great or greater than in any of the countries of the old world from which they come.

HENRY FAIRFIELD OSBORN,

Chairman of the New York Local Committee for the International Zoological Congress.

ATTENDANCE AT MUSEUMS AND PARKS FOR 1906.

History 476,133 Brooklyn Museum 143,047 Children's Museum, Brooklyn 85,981 Free Lectures (zoological subjects only) 60,000 Central Park Menagerie, no records.

Total4,193,647



COLUMBIA UNIVERSITY, 1907.

The large building in the foreground is Schermerhorn Hall. At the extreme right is St. Paul's Chapel,

FOREIGN BORN POPULATION OF NEW YORK, CENSUS OF 1900.

Total population	New	York	City,	1905,
4,014,304.				
Austria				71,427
Bohemia				15,055
Canada (English) .				19,399
Canada (French)				2,527
Denmark				5,621
England				68,836
France				14,755
Germany			;	322,343
Holland				2,608
Hungary				31,516
Ireland			:	275,102
Italy				145,433
Mexico				282
Norway				11,387
Poland (Austrian) .				3,995
Poland (German) .				1,881
Poland (Russian) .				25,231
Poland (unknown)				1,766
Russia				155,201
Scotland				19,836

Sweden	
Switzerland	
Wales	
Other countries	37,502

Total, foreign born, 1900 1,270,080

COLUMBIA UNIVERSITY.

DEPARTMENT OF ZOOLOGY.

THE Department of Zoology of Columbia University was founded in 1891 and opened for students in 1892. Charles M. DaCosta and Charles H. Senff have been its chief benefactors. Henry Fairfield Osborn was appointed head professor in 1891; associated with him were Professors Edmund B. Wilson and Bashford Dean. Professor Wilson succeeded to the direction of the department in 1900. The present faculty consists of Professors Wilson, Osborn, Dean, Gary N. Calkins, Henry E. Crampton, Thomas Hunt Morgan and J. H. McGregor.



COLUMBIA UNIVERSITY, 1997. Showing Faculty Club, School of Mines, Earl Hall, Engineering, West Hall and the Library.

The instruction includes elementary and intermediate courses in zoology for students of the College, also advanced lecture and research courses for graduates in general zoology, experimental zoology, comparative anatomy, vertebrate palæontology, embryology and cellular biology. These are conducted in the laboratories on the top floor of Schermerhorn Hall, which stands at the northeast corner of the University quadrangle. Courses for medical students in anatomy, histology, physiology and embryology are given at the College of Physicians and Surgeons in West Forty-ninth Street.

The Zoological Department maintains its own library, aquarium and a teaching museum, but relies for the purposes of a general museum on the American Museum of Natural History, the great collections of which are available for study by all qualified students. Opportunities for experimental and embryological research are also offered in the Zoological Park and the New York Aquarium. For marine study students avail themselves of the opportunities afforded by the Woods Hole, Cold Spring Harbor, Harpswell and Naples Stations. The department has also sent out from among its staff and graduates a number of special investigators to various collecting regions, including especially Puget Sound, Alaska, Southern California, Bermuda, Egypt, Japan and the Philippines.

University lecture courses, partly by lecturers from other institutions of this country and abroad, have led to the publication of the Columbia University Biological Series, begun in 1893, and now numbering ten volumes. Experimental and cytological studies appear chiefly in the Journal of Experimental Zoology. Other researches are chiefly published in the Transactions of the New York Academy of Sciences and in Bulletins and Memoirs of the American Museum of Natural

History.

The purpose of the instruction and research of the department is to cover the advanced aspects of all the chief branches of modern zoology.

NEW YORK UNIVERSITY.

DEPARTMENT OF BIOLOGY.

THIS department is in connection with the University undergraduate colleges at University Heights, and is best reached by the Subway, with a transfer at the 181st Street Station to the Aqueduct Avenue trolley seven minutes direct to the College Campus.

History. The Department of Biology, including Zoology, of New York University as a distinct department, commanding the whole time of a head professor with one or more assistants, was organized in 1894 upon the removal of the undergraduate schools of New York University to University Heights. Charles Lawrence Bristol, graduate of the New York University College in the Class of 1883, and Doctor of Philosophy from the University of Chicago of 1896, and for a time Professor of Zoology in the State University of South Dakota, was made head professor. His principal assistants have been Frederick Walton Carpenter, now Professor of Biology in the University of Illinois, and George William Bartelmez.

Plan and Scope. The work of the Biological Department has been chiefly the instruction of the undergraduates in the University College of Arts and Pure Science. This College has for thirteen years employed the group system and both in the Natural Science Group and the Medical Preparatory Group Biology is a required study throughout three years, beginning with the Sophomore Year. Not more than one course in any year in Biology has been offered in the Graduate School of the University. This limitation arises from the lack of an enlarged equipment and endowment.

Station in Bermuda. For ten years this department of the University has maintained a Summer Biological Station in Bermuda in charge of Professor Bristol. He has devoted himself largely to a reconnaissance of the reef and island fauna and to research in various This was pioneer work in that hitherto little known zoological field. One of the results of this effort has been to bring Bermuda prominently to the attention of American zoologists and to prepare the way for a permanent Biological Station. Requests for information concerning the facilities and opportunities of this New York University Biological Station in the Bermudas may be addressed to Professor Charles L. Bristol, at University Heights.

Laboratory Building. The Andrew H. Green Laboratory was built for biological work, which at present, however, occupies only the cellar and one story, the other story being temporarily used for the Department of Drawing. The building is 110 feet long and about 30 feet wide. There is a lecture hall seating 100 students, equipped with projecting lan-

tern, charts, etc. Two general laboratories for students are at either side, also two private laboratories, one of these four laboratories possessing the usual equipment. Besides these, is a small Museum, vivarium, preparator's room, small departmental library, etc.

Summer School Biology. In addition to the regular College instruction, the department offers in the University Summer School at University Heights, five hours daily of biological work particularly designed for teachers.

THE COLLEGE OF THE CITY OF NEW YORK.

WASHINGTON HEIGHTS.

139th Street and Amsterdam Avenue.

THE new and extensive buildings of the College are approaching completion and will be occupied by the college classes in the coming fall term. The College is maintained by the City as a part of its public educational system. It is open to young men of



COLLEGE OF THE CITY OF NEW YORK.

A General View of the various Halls and Buildings

Medical Biology. Extensive Medical Laboratories of Anatomy, Physiology, Materia Medica, Histology, Pathology and Bacteriology are situated in the University Medical College laboratory buildings on First Avenue, between 25th and 26th Streets. In these laboratories professors of the University Veterinary College also conduct instruction. The total enrollment of medical and veterinary students the present year is 493.

every borough of the city who meet the requirements for admission. There is no tuition fee. Libraries, laboratories and text-books are also provided for the free use of all students, under restriction of proper care. The Courses of Study are divided into two groups, one leading to the degree of Bachelor of Arts, and the other to the degree of Bachelor of Science. The Department of Natural History aims to secure:



COLLEGE OF THE CITY OF NEW YORK.

a. That complete educational and all-round cultural development which may be obtained only through the study of Nature.

b. Training in the methods and technique of science with a view toward preparation for investigation or for teaching.

c. Preparation for the study of medicine, pharmacy, forestry, sanitation, or the pursuit of a commercial career.

The various subjects related to zoology offered by the department include Elementary Biology, Elementary Physiology (human), Zoology, Human Anatomy, Physiology and Hygiene, Microscopy, Histology and Cytology, Embryology and Theoretical Biology, Sanitary Science, Comparative Anatomy, Advanced Physiology, Economic Biology.

The department is located on the third and fourth floors of the south wing of the Main Building, and consists of a lecture room, seating two hundred, a department library, office, workshop and storerooms, five combination laboratory and recitation rooms, each equipped with twenty-seven desk spaces and twenty-seven of the typical recitation chairs, a lantern and screen, glass blackboards and cases for types and material, preparation rooms adjoining the laboratories and a museum.

In the Living Plant Room are two alcoves, each with four large aquaria, modeled after those in the New York Aquarium, two shallow-water floor tanks, and several small aquaria, a large laboratory and several small ones for special preparation and research.

The President of the College is Dr. John Huston Finley. Dr. William Stratford is Professor of Natural History; Dr. Ivin Sickles, Associate Professor of Natural History; Dr. Francis B. Sumner and Mr. George G. Scott, Instructors in Natural History.

THE BOARD OF EDUCATION.

THE Board of Education consists of forty-six members, appointed by the Mayor for a term of five years. The City Superintendent of Schools is Dr. William H. Maxwell, and there are eight Associate City Superintendents.

STATISTICS OF PUBLIC SCHOOLS.

STATISTICS OF TOBLIC SCHOOLS	
High Schools	19
Training Schools for Teachers	3
Elementary Schools	3 486
Truant Schools	2
Nautical School	I
Total number of teachers	15,176
Register, May 31, in High Schools 22,356	
Register, May 31, in Ele-	
mentary Schools 565,078	587,434
Average attendance (1906) Vacation	
Schools	16,178
Average attendance (1906) Vacation	
Playgrounds	42,902
Average attendance (1906) School	
Roof Playgrounds	23,955

ZOOLOGICAL SOCIETY BULLETIN

ELWIN R. SANBORN, ASST. EDITOR

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BOARD OF EDUCATION—Continued.

Kindergartens	601 18,556
Evening Elementary Schools, 1906- 1907	83
Schools Evening Elementary Schools	87,228 13
Register in Evening High Schools	20,728

In the City of New York a child studies nature in some form during seven years of its public elementary school career.

The nature course of study is divided into three cycles, each of which is carefully adapted to the age and mental development of the child.

In the first cycle, covering the first four years of school life, the child is taught to gather facts about plants and animals by observation. He is taught to recognize and name natural objects and to respect life in whatever form it may appear.

In the second cycle the pupil is taught to

arrange in an orderly manner the facts acquired by observation-in other words, to classify in an elementary way. In this cycle order is brought out of seeming chaos.

In the third cycle, covering the last two years of the course, the experimental science of physics supplants the observational work on plants and animals. Physics is taught by experimental demonstrations by the teacher, by individual laboratory work on the part of the pupils, and by recitations and discussions.

In order to facilitate the study of this subject experimentally, all of the new buildings and many of the old buildings have a science room equipped with gas, running water, a demonstration table and opaque shades. Some knowledge of gravity, the mechanical powers, the mechanics of liquids and gases, sound, heat, light, magnetism and electricity is given to the pupils. A large percentage of the children in the public schools visit the City museums in classes with their teachers.

FREE LECTURES.

This work of the Board of Education is under the supervision of Dr. Henry M. Leipziger.

The total attendance at public lectures dur-

ing season 1906-1907 was 1,141,447.

The total number of lectures was 5,464. Three hundred were on Zoology or allied subjects, approximating a total attendance of 60,000 persons for the year on the subject of Zoology.

The number of lecture centers for the year was 167; the total number of lecturers be-

tween 500 and 600.

The expenses of the Free Lecture Bureau are between \$150,000 and \$200,000 per year.

THE MORRIS HIGH SCHOOL.

This school is one of the nineteen free public high schools of New York City of similar design.

Location. The Morris High School is situated on Boston Road and 166th Street, four minutes' walk from the Third Avenue Elevated Station at 166th Street. It has a commanding position in one of the highest parts of the Bronx, and its Gothic tower can be seen for miles around.

The building is five stories in height above the basement and sub-basement, and has fortysix regular class rooms, twelve laboratories of science, four lecture and demonstration rooms, two gymnasiums and an auditorium capable of seating over 1,300.



MORRIS HIGH SCHOOL.

A typical New York High School under the Board of Education.

Attendance. Nearly 2,400 boys and girls, in age from thirteen to nineteen years, attend the school. Many of them take courses that fit them to enter Columbia or other leading universities and the free colleges and the teachers' training schools of the City.

Faculty of the School. The faculty of ninety teachers is organized into departments, each with a head to supervise department work. The heads of department constitute a cabinet which the principal of the school frequently calls together for consultation. In the department of biology there are nine teachers.

Courses in Biology. Throughout the City a course in biology is required of every first year student in the high school. The subject is presented with three points of view, namely, those of plant biology, animal biology and human biology. It is manifestly impossible in the 200 lessons (forty-five minutes each) to study a large number of plants and animals, so a dozen or more common forms are selected to illustrate the fundamental physiological

processes, and emphasis is constantly laid on function rather than on details of structure.

In the fourth year of the curriculum an elective course (four periods a week) is offered. Those who begin the work in September take a year's work in zoology, while those who begin in February take botany. From forty to fifty students elect this work each year.

Biological Laboratories and their Equipment. The biological department occupies, on the third and fourth floors, six laboratories, a lecture room, a vivarium, a preparation room, an office and four supply rooms. The equipment includes ninety compound miscroscopes, Leuckart charts, Jund botanical charts, photomicrographs, a stereopticon for opaque projection for slides and for microscopical objects, a hive of bees, and good collections of museum preparations.

The head of the Department of Biology is James E. Peabody, A.M., and there are eight biology teachers.



MORRIS HIGH SCHOOL.

A Class-room for the study of Zoology.

AMERICAN MUSEUM OF NATURAL HISTORY.

Built and Maintained by the City. Endowed and Administered by Private Citizens.

THE American Museum of Natural History was founded and incorporated in 1869, and for eight years its temporary home was in the Arsenal in Central Park. The cornerstone of the present building was laid in 1874, and in 1877 the first section (North Wing) was completed. It is now the largest municipal building in the City, and has cost approximately \$1,000,000. The South Facade is 710 feet in length; the total area of the floor space is 370,000 square feet, or about $8\frac{1}{2}$ acres, of which 260,000 square feet are open to the public.

The Museum is under the direction of a Board of Trustees, of which Mr. Morris K. Jesup is president; he is well known to men of science because of his personal support of exploring expeditions and his interest in the promation of science. Since 1890 Professor Osborn has assisted Mr. Jesup in the develop-

ment of the Museum. The Director of the Museum is Dr. Hermon C. Bumpus.

The City provides funds for the maintenance of the Museum (in 1907 \$100,000), but such appropriations are not available for the purchase of specimens, the carrying on of field work or the publication of scientific papers. Appropriations for these purposes are derived from the income from invested funds (Permanent Endowment in 1907, \$1,013,000) and from the contributions of the Trustees, "Members" and other friends. There are over two thousand who, as "Patrons," "Fellows" or "Members," regularly support the Museum.

The total expenditures in the Museum in 1906 were (exclusive of new construction) \$295,924. The attendance in 1906 was 476,133. The hours for visitors are from 9 A. M. to 5 P. M. daily, and from 1 to 5 P. M. Sundays. Open two evenings each week.

Explorations. The Museum exhibits are partly the result of gifts and purchases, but chiefly the result of explorations, which have been conducted on a large scale in nearly every continent.



BRONTOSAURUS IN THE MUSEUM OF NATURAL HISTORY, NEW YORK

Publications. The Museum publishes a "Journal," "Bulletin," "Memoirs," "Anthropological Papers" and "Guide Leaflets."

Collections. On the ground floor one enters the "Foyer," a room devoted to a series of gigantic meteorites. Occupying niches are busts, in marble, of the pioneers of American science. At the left, or west, of the "Foyer" are anthropological collections of North American and Siberian tribes; at the north, those of the Indians of the Northwest and of the Eskimo. Beyond the Eskimo Exhibit is the Auditorium, with a seating capacity of 1,400. Two screens for lantern projection. In 1905, 74,805 adults and 46,399 school children attended lectures in this hall. At the right, or east, of the "Foyer" are the elevators, the Jesup Collection of North American Woods, and the

Hall of Invertebrates. The installation gives a synoptic view of the Animal Kingdom. Note the alcove labels, the models of invertebrates in Alcoves 3, 4, 6, 7, 9 and 10, the Crab group, near the center of the hall, and the corals in the tower room. Curator of Invertebrates, Dr. William M. Wheeler; Assistant Curators, Dr. Roy W. Miner, Dr. B. E. Dahlgren.

The Main Floor. The Central Hall contains miscellaneous manmals. Note the "Carnegie Lion." The halls in the West Wing contain ethnological and archæological collections. In the North Hall note the Bird groups, particularly the Laborador Duck (extinct), the Ptarmigan and Cassique groups. Beyond the North Hall, and to the left, are the Fish Corridor and the various laboratories of the Department of Preparation. Messrs. Figgins and Clark are in charge.

To the right, or east, of the Central Hall are the best specimens of mammals.

Mammals. Of interest are the Moose, Buffalo and Peccary groups. In the room beyond (East Mammal Hall) will be found some of the most recent installations of large mammals and the best of Mr. Clark's modeling. On the right of this hall and in the tower room the Reptiles are temporarily installed. Examine the Flying Lizard, Heloderma, Iguana and Rattlesnake groups. These specimens are not models in plaster. They are mounted skins.

The Third Floor. At the left, or west, of the Central Gallery is the Collection of Local Birds and the Corridor of Auduboniana, In



THE AMERICAN MUSEUM OF NATURAL HISTORY.

the hall beyond are the Peruvian and Chinese ethnological collections. In the North Gallery the "Habitat groups" of North American bird life will prove especially interesting, since they exhibit incidentally several characteristic examples of American scenery. In the East Gallery are mammal collections. Note the lifesize model of the Sulphur-bottom whale. In the hall beyond the whale model are the collections of insects. Curator of Mammalogy and Ornithology, Dr. J. A. Allen; Associate Curator, Mr. Frank M. Chapman; Curator of Entomology, Mr. William Beutenmuller.

The Fourth Floor. At the right as one leaves the elevator are the Halls of Fossil Vertebrates. Of particular mention in the Hall of Fossil Mammals are specimens showing the Evolution of the Elephant, of the Horse and of the Camel. In the Hall of Reptiles, at the extreme east, see specimens of the Brontosaurus, Allosaurus, Iguanodonts and of the Permian Naosaurus.

Curator of Vertebrate Palæontology, Prof. Henry F. Osborn; Associate Curator, Dr. W. D. Matthew; Associate Curator of Chelonia, Dr. O. P. Hay; Curator of Fossil Fishes, Dr. Bashford Dean; Assistant, Dr. Louis Hussakof.

In the Central Hall is the Bernent Collection of Minerals; in the hall adjoining, to the west, is the Gem Collection, and beyond the Gem Hall are the collections of Mexican Archæology. In the North Hall are the fossil Invertebrates. Curator of Invertebrate Palaeontology, R. P. Whitfield; Curator of Mineralogy and Conchology, Mr. L. P. Gratacap.

The Fifth Floor. Beyond the "Shell Hall" are the Library, Reading Room and Department of Physiology, Curator of Books and Publications and Department of Physiology, Prof. R. W. Tower.

The remainder of the floor is devoted to offices and laboratories, as follows:

West Wing, Anthropology; North Wing, Mammalogy, Ornithology, Invertebrate Zoology, Entomology; East Wing, Vertebrate Palæontology and the Administrative Offices,

THE NEW YORK ZOOLOGICAL PARK.

Maintained by the City, Directed by the New York
Zoological Society.

THE New York Zoological Park was projected by the Society in 1895. After a year of preliminary study of all the foreign zoological gardens by Director Hornaday, a preliminary plan was submitted by him and approved.

Work was begun in 1896. The central ideas were that it should be a free institution developed on a large scale for the benefit of the millions of a great city; that it should occupy an extensive forest area, which should be developed in a natural manner, giving each type of animal as far as possible something akin to its natural habitat, and that the plans for the management, the grounds, and the buildings, while benefitting by all previous experience, should not be bound by any traditions, but should seek a free and original development.

The Park. In order that the Zoological Park idea might be carried out, the city allotted to the society a splendid tract of two hundred and sixty-four wild acres of great beauty and adaptability. A unique combination of hill and dale, forest, meadow, rocks, and water, found along the Bronx River, offered an ideal opportunity for the creation of a zoological park dedicated to a representation of wild animal life. The forest has been care-

fully preserved, and extensive additions to the tree flora have been made by judicious planting, exclusively of native species of trees and shrubs. The rock ledges have been preserved, and in many ways rendered more beautiful and interesting than before. Every building, outdoor den, cage, range and road has been located and developed to fit into the handiwork of nature. The outdoor animals have been located in the spots they would naturally have chosen for their haunts.

Administration. In maintenance and administration the park represents the idea, which has been developed only in the City of New York,* of the municipality standing the cost of annual maintenance and of the erection of the larger number of the buildings, while the society as proof of its own financial support erects a considerable number of the buildings and presents all the animal collections. In short, the park is the result of a joint effort on the part of the New York Zoological Society and the City of New York. The burden of design, construction and management devolves entirely upon the society, while the financial burden is shared by both. As gifts to the City the society has expended up to date about \$446,000, erecting the Reptile House, the Aquatic Bird House, the Bear Dens, the Flying Cage and many smaller installations. Since 1901 the municipality has expended \$1,875,000.

Attendance. In 1906 the visitors to the park numbered 1,321,917, a number greater than the entire population of any city in all America except New York, Philadelphia and Chicago, and more than double the total population of the City of Boston. On two days of each week, Monday and Thursday, an admission fee of twenty-five cents is charged, the income from this source being devoted to the purchase of collections.

Collections. On May 1st, 1907, the animal collections included 638 mammals, 2,218 birds, 900 reptiles and amphibians, making a total of 3,756 living vertebrates, representing 844 species. Of mammals there were 196 species, of birds 510, of reptiles and amphibians 138. At the present date the totals are larger, especially in the bird department.

Health of Animals. Visitors to the park will especially notice the generally healthy condition of the animals. This is due in the first place to the space, sunlight and pure air

*In Washington the United States Government supports the National Museum and the Zoological Park entirely, including buildings, maintenance and collections. In Boston, Philadelphia, Chicago, and Pittsburg the museums are supported by private contributions and by admission fees. provided in the installations, to constant attention to hygienic details, to a quarantine system of admission, and to the very careful scientific treatment of sick or injured animals by a staff of trained experts. The death rate has been reduced materially through the application of scientific methods of treatment and through the scientific investigation of the causes of death. A work is in preparation describing the results already obtained. A biological, chemical and pathological laboratory building, to cost \$22,000, is completely planned and soon will be constructed.

Labeling. A second point to which visitors' attention is called is the system of descriptive picture labels and maps of distribution with which the park collections are liberally furnished. They represent a great amount of effort, and many difficulties overcome. Of all educational collections the most difficult to label profusely and successfully are the collections at a zoological park, particularly because very many of the labels are exposed to the weather.

Completion of the Park. The Zoological Park is now nearing the point of completion, and it is expected that the original plan of 1896 will be carried out in the course of the next two years. At the present time the park contains 20 buildings for animals, 10 large groups of outdoor dens, aviaries and corrals, 2 restaurants, 6 public comfort buildings, 8 entrances, 734 miles of walks and 10½ miles of fence. When the Elephant House is completed there will remain to be erected the Administration Building, the Zebra House, and the Eagle Aviary, plans for which have been completed.

Education. As an institution for the education of the public, and especially the pupils of the public schools, the park is already doing its full share; but in the near future, with new construction work out of the way, far more will be done. The present temporary lecture pavilion will be replaced by a permanent structure with a seating capacity of 1,000, and all the calls of the Board of Education for lectures in the regular school course of study will be met.

Staff. The maintenance force is composed of 117 persons, and the total annual cost of maintaining the park and its collections is (for 1907 only) \$141,558. The executive head is Dr. William T. Hornaday, who is Director and General Curator; Mr. Raymond L. Ditmars is Curator of Reptiles and Assistant Curator of Mammals; Mr. C. William Beebe is Curator of Birds, and Dr. W. Reid Blair is Veterinary Surgeon and Prosector.



THE PRIMATE HOUSE IN THE NEW YORK ZOOLOGICAL PARK.



A PORTION OF BAIRD COURT, NEW YORK ZOOLOGICAL PARK. Showing the new Bird House for Perching Birds, and the Sea-lion Pool.



MAIN HALL OF THE NEW YORK AQUARIUM.



VIEW OF THE AQUARIUM AND NEW YORK BAY.

THE NEW YORK AQUARIUM.

Maintained by the City, Directed by the New York Zoological Society.

THE AQUARIUM is situated in Battery Park and is reached by all elevated, surface and subway lines running to South Ferry. It was founded by the City on December 10, 1896, and on November 1, 1902, its management was transferred from the Department of Parks to the New York Zoological Society.

The Building. The Aquarium building was erected in 1807 by the United States Government as a fort, called Southwest Battery, and after the war of 1812 was called Castle Clinton. In 1823 the building was ceded by Congress to the City of New York and used as a place of amusement called Castle Garden, which had a seating capacity of 6,000. General Lafayette was received here in 1824; President Jackson in 1832; President Tyler in 1843; Louis Kossuth in 1851. Jenny Lind began singing here in 1850 under the management of P. T. Barnum. The building was used as a landing place for immigrants from 1855 to 1800, during which period 7.600,606

immigrants passed through its doors. The number of persons who entered the building while it was called Castle Garden must have been very great. As an aquarium the attendance has already exceeded 17,000,000.

Size. The New York Aquarium is one of the largest in the world, and contains a greater number of species and of specimens than any other aquarium. It has 7 large floor pools, 94 large wall tanks and 30 smaller tanks. There are also 26 reserve tanks containing specimens not on exhibition. The building is circular in form, with a diameter of 205 feet. The largest pool is 37 feet in diameter and 7 feet deep.

Water Supply and Equipment. The Aquarium is equipped for heating sea water for tropical fishes in winter and has a refrigerating plant for cooling fresh water in summer. An air compressor furnishes extra aeration to all tanks when necessary. Flowing fresh water is supplied from the city water system, while the pumps circulate about 300,000 gallons of salt water daily. The pumps run day and night, and the engineroom men work in eight-hour watches.

Brackish water for the large floor pools is pumped from the Bay through a well under the building. The salt-water wall tanks, now being supplied from the Bay, will soon be supplied from a reservoir holding 100,000 gallons of pure stored sea water. This water, to be brought in by steamer, will be used as a "closed circulation," the water being pumped through the exhibition tanks and falling thence, through sand filters, back to the reservoir. The supply pipes to all tanks are of vulcanized rubber. The drainage pipes from the salt-water tanks to the reservoir are iron pipes, lead lined.

Exhibits. The exhibits include fishes, turtles, crocodilians, frogs, salamanders, marine mammals and invertebrates, and are both northern and tropical in character. There are usually about 200 species of fishes and other aquatic vertebrates on exhibition. The total number of specimens, exclusive of invertebrates and young fry in the hatchery, varies from 3,000 to 4,000. Many individuals in the collection of fishes and turtles have lived in

the building from five to ten years.

The fish hatchery, maintained as a fishcultural exhibit, produces yearly about two millions of young food and game fishes, which are afterward deposited in New York State waters. Fish eggs are supplied by the U. S. Bureau of Fisheries from Government hatcheries. Most of the local fresh-water and saltwater species are collected by the employees. Tropical fishes are brought by steamer from the Bermuda Islands.

Laboratory for Education and Research. There is a laboratory containing many kinds of small marine invertebrates, which is visited by 4,000 or 5,000 school children with their teachers during the year. One member of the Aquarium staff assists the city school teachers in maintaining small aquaria in 150 or more schools in Greater New York. Small marine forms of life are supplied free to teachers from the reserve tanks of the Aquarium. The laboratory is used at times by university professors in the city for marine biological investigations. It is equipped for photographic work on aquatic life.

Library. The library attached to the Director's office contains at present about 600 volumes, and is limited to works relating to fishes, fish-culture, fishery industries, angling

and aquatic life in general.

Publications. The Aquarium publishes annual reports and occasional bulletins, which are issued as publications of the New York Zoological Society. The first volume of a proposed New York Aquarium Nature Series

has already appeared under the title of "Sea-Shore Life," a popular account of the invertebrates of the adjacent coast region. Other volumes are in course of preparation.

Staff. There are, exclusive of the Director and clerk, 25 employees whose duty is to attend to the supply and temperature of the different water systems, feed and care for the collections, clean the building and tanks and look after visitors. The Director is Mr. Charles H. Townsend, formerly Chief of the Division of Fisheries in the United States Fish Commission. Mr. W. I. De Nyse is the assistant in charge of marine collections, and Mr. L. B. Spencer the assistant in charge of fresh-water collections and public school aquaria.

Hours. The building is open FREE, every day in the year. It is closed on Monday forenoons except to school teachers with their classes, and to members of the New York Zoological Society. When a holiday occurs on Monday the public is admitted as on other

days.

The hours for visitors are:

9 A. M. to 5 P. M. from April 15 to October 15.

10 A. M. to 4 P. M. from October 16 to

April 14.

Attendance. The attendance for the ten years ending December 31, 1906, amounted to 17,103,328—an average of 4,685 visitors a day. The attendance for the year 1906 was 2,106,569—an average of 5,771 a day.

Cost of Maintenance. The annual appro-

priation for the Aquarium is \$45,000.

CENTRAL PARK MENAGERIE.

THE Central Park Menagerie, under the control of the Department of Parks, was founded about 1861. It is situated near the southeast corner of Central Park at Fifth

Avenue and Sixty-fourth Street.

It has, according to the last report of Hon. Moses Herrman, Commissioner, a collection consisting of 360 mammals, 581 birds and twenty-five reptiles, among which may be mentioned the elephant, rhinoceros, hippopotamus, camel, cape buffalo, bison, zebu, gnu, oryx, nylgau, wapiti, aoudad, polar, grizzly, black and cinnamon bears, leopard and Manchurian tiger.

The two-horned African rhinoceros and the pair of hippopotami have lived continuously in the menagerie for twenty years, the hippopotami having given birth during that time to eight young, all of which have been



MUSEUM OF THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES.

raised and sold to other collections. The larger of the two Indian elephants has been in the menagerie for nine years, and the Manchurian tiger for five years.

The collection of small mammals and birds contains numerous species. While the exhibits are not extensive, nor arranged with any scientific purpose, the Central Park Menagerie is conveniently located and of much interest to the down-town public.

BROOKLYN INSTITUTE OF ARTS AND SCIENCES.

THE offices of administration are in the Y. M. C. A. Building, 502 Fulton Street, Brooklyn. Ten other buildings are occupied by the Institute, wholly or in part.

History. Founded in 1824 as an Apprentices' Library. Cornerstone of first building laid at the corner of Henry and Cranberry Streets, July 4th, 1825, by General Lafayette. Reincorporated as the Brooklyn Institute in 1843 with Natural History Departments and with collections in zoology, botany, geology and mineralogy. Incorporated in 1890 as the Brooklyn Institute of Arts and Sciences with present form of organization, plans and purposes. Comprises twenty-seven departments or societies, each representing one or more

of the arts and sciences. Total membership,

Meetings. Public lectures, annually, 470; special lectures, readings, conferences and class exercises, 3,536; total annual gatherings, 4,006.

Attendance. The attendance has increased from 6,900 in 1888, to 449,595 in 1906-7. Total attendance in nineteen years, 6,073,765.

Receipts. The annual income available for meeting the expense of the Institute is (in 1906-7) \$197,925.99.

Lectures and Instruction. The lectures and courses of instruction are given by a large number of the most distinguished men in their special lines of work from universities, colleges and other institutions of learning in this country and in Europe.

Employees. Exclusive of the Museums the number regularly employed by the Institute is thirty-five.

The publications of the Institute are "The Year Book," "Annual Prospectus," "Monthly Bulletin" and "Brief Prospectus." For other publications, see Institute museums. Information respecting the museums and biological laboratory of the Brooklyn Institute will be found on pages 384, 385 and 386. The President of the Institute is Mr. A. Augustus Healy and the Director, Prof. Franklin W. Hooper.



THE CHILDREN'S MUSEUM OF THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES.

Museum of the Brooklyn Institute of Arts and Sciences.

The Museum is situated on Eastern Parkway, and is easily accessible by the Flatbush Avenue trolley cars, the Ninth or Vanderbilt Avenue cars and the St. John's Place cars

from the Bridge.

Hours. The building is open Free, every day in the week excepting Mondays and Tuesdays, when an admission fee of twenty-five cents is charged for adults and ten cents for all children under fifteen years of age. The hours for visitors are 9 A. M. to 6 P. M. on weekdays and 2 P. M. to 6 P. M. on Sundays and 7.30 to 9.30 Thursday evening

Attendance. The attendance for the ten years ending December 31, 1906, was 1,091,717, the largest for any one year being 143,047, for 1906, or an average of 391 a day.

Size. The Museum building is 524 feet in length, the Eastern and Western wings being approximately fifty-five feet in depth, and the Central or Dome section 120 feet. The top floor of the building is devoted entirely to Art, the second floor to Natural History and the first floor contains the Hall of Ethnology, Sculpture, Ceramics and other art objects.

The basement contains a lecture room having a seating capacity of 1,300, offices and work rooms as well as one hall devoted to the Ethnology of the Pacific Islands and the East. The Library will later on be removed to this

section.

Exhibits, Department of Natural Science. The exhibits of the Department of Natural Sciences, owing to lack of space. are at present only provisionally arranged. They comprise an extensive series of sponges, corals and mollusks, good collections of insects, a small number of birds and a moderate series of mammals. It is intended, so far as possible, to make these collections of educational value, the intention being to give a general outline of the animal kingdom, each large group accompanied by specimens illustrating its more evident characters, and to furnish as well good illustrations of the factors

bearing upon the evolution and distribution of animals.

In addition to the specimens included in the systematic series, there are a number of groups of insects, birds and mammals showing life histories or illustrating habits and habitats. These include among others, the Golden Eagle, King Penguin, Orinoco Hang Nest, Musk Ox, Walrus, Fur Seal and Mountain Goats. There is a special series illustrating flight, including mounted specimens and skeletons of the various vertebrates that fly or sail.

One room is devoted to the fauna of Long Island, but at present includes only a number of the birds, and there is an extensive series of eggs of North American birds, and another series showing the variation in size, number

and character of birds' eggs.

The Museum contains a small study series of South American birds and very important collections of insects, especially in Coleoptera and Lepidoptera, the latter comprising about

30,000 specimens.

Other Exhibits. The Department of Fine Arts has on exhibition important collections of paintings, statuary and ceramics, as well as a series of casts from the antique. The Department of Ethnology has one entire hall devoted to exhibits illustrating the life, arts and industries of the Southwestern Indians. All exhibits are very fully labeled and in many

cases accompanied with sketch illustrating the

use of the object shown.

The Curator in Chief is Mr. Frederic A. Lucas, formerly Curator in the United States National Museum. The staff of the Department of Natural Science is as follows: Curator of Botany, Edward L. Morris; Curator of Entomology, Jacob Doll; Associate Curator of Entomology, Carl Schaeffer; Curator of Ornithology, George K. Cherrie.

Publications. The scientific publications of the Museum consist of a "Natural Science Bulletin," issued from time to time, and so far largely devoted to descriptions of new insects obtained by the Museum expeditions. A yearly report is issued, and during eight months of the year, in conjunction with the Children's Museum, "The Museum News" is published monthly, noting the number of accessions to the Museum and giving informa-* tion in regard to its active work.

Library. The Museum library consists of 16,000 volumes covering the Museum subjects, namely: Fine Arts, Natural Science and Ethnology. It is especially strong in zoological indexes, including the Concilium Bibliographicum cards, and in Entomology and American Ethnology. It is free to the public for reference use only. The appropriation for the Museum for 1907 amounted to \$95,000.

The Children's Museum.

The Children's Museum, a branch of the Brooklyn Institute of Arts and Sciences, is situated in Bedford Park, which is bounded by Brooklyn and Kingston Avenues and Prospect and Park Places. The building is open FREE every weekday in the year and on Sunday afternoons. The hours for visitors are: 9 A. M. to 5.30 P. M. weekdays, 2 P. M. to 5.30 P. M. Sundays. The attendance for the seven years, ending December 31st, 1906, amounted to 615,393, an average of 240 per day The Children's Museum occupies an old residence, which comprises nine exhibition rooms, two main halls, a lecture room and

Exhibits. Its collections are selected and installed with special reference to the enjoyment and educational needs of children, and illustrate the following branches of learning: Zoology, Botany, United States History, Geography and Art. Besides the larger collections, smaller exhibits are permanently installed. Among these are a Color Exhibitwhich shows natural objects of brilliant colors: Silk Exhibit-showing silk caterpillars, moths' eggs, etc., specimens of raw silk, silk thread and cloth; an exhibit illustrating best methods for capturing and preserving insects.

Small aquaria, vivaria and animal cages containing living fish, tadpoles, leeches, newts, dragon fly larvæ, water beetles, frogs, toads, snakes, turtles, lizards and small animalssuch as rats, guinea pigs and rabbits-are kept on exhibition throughout the building for the especial benefit of those city children who seldom go to the country.

Aim and Work of the Museum. The Museum is distinctly an educational institution, whose aim is to attract and interest children in the subjects represented by its collections. It seeks the co-operation of teachers in the schools by correlating its exhibits with the school courses of study and by maintaining regular free courses of lectures arranged for the grades in school. The attendance at these lectures alone in 1906, though strictly voluntary, exceeded 17,200 during the school months. Miss Anna B. Gallup is the Curator, and there are two assistants, one of them being a librarian.

BIOLOGICAL LABORATORY OF THE BROOKLYN INSTITUTE OF ARTS AND SCIENCES.

This laboratory is adjacent to the Station for Experimental Evolution, at Cold Spring Harbor. The laboratory, known as the John D. Jones Laboratory, is a one-story building with a high roof, placed near the sea wall. It consists of one large central room for students, six smaller rooms for investigators and two store rooms. About one thousand feet to the northward is a second laboratory fitted with thirteen small rooms for investigators. The work at this laboratory is carried on chiefly during the months of July and August. Students and investigators are housed in three dormitories, and meals are supplied in one of them. Of the dormitories, the most important is Blackford Hall on the highest part of the land of the laboratory. This building is made wholly of reinforced concrete and is 125 feet long by 30 feet wide and two stories high. It contains an assembly room, a dining room with a capacity of a hundred persons, a kitchen, store rooms in the basement and twenty-four sleeping apart-Running water is obtained from a ments. lofty spring on an adjacent hill.

The laboratory has the use of a thirty-five foot naphtha launch for collecting, and is provided with small boats and ordinary collecting equipment. Instruction is given almost



THE JOHN D. JONES LABORATORY BUILDING, COLD SPRING HARBOR.

exclusively to teachers, and consists largely of field work. Dr. C. B. Davenport is Director of the Laboratory, and is assisted at the present time by a corps of twelve instructors.

The annual budget of the Biological Laboratory is about \$3,000. About fifty to sixty students, investigators and teachers are resident during the summer months. The results of investigations are published in various journals. In addition, a series of Cold Spring Harbor Monographs, treating bionomically of particular organisms, has been established, of which six numbers have already appeared and three others are in press.

STATION FOR EXPERIMENTAL EVO-LUTION (CARNEGIE INSTITUTION OF WASHINGTON).

THE Station for Experimental Evolution is situated at Cold Spring Harbor, Long Island, thirty-two miles from New York. It is located on ground adjacent to the Biological Laboratory of the Brooklyn Institute of Arts and Sciences and the New York Fish Hatchery. The ground occupied by all of these institutions, about fifteen acres, is held in trust from the late John D. Jones, by the

Wawepex Society of Cold Spring Harbor, and is leased for a long term of years.

The Station for Experimental Evolution was estab-lished by vote of the Board of Trustees of the Carnegie Institution of Washington, December, 1903, by the appointment of Dr. C. B. Davenport, of the University of Chicago, as Director. During 1904 the Station came into possession of the ten acres of land which it now occupies. The present staff was

gathered together and a main building was erected.

The purpose of this Station is to study experimentally heredity and variability of organisms and the improvement of races by hybridization and selection. All the factors which have played a part in organic evolution come into the general scope of the work of this Station. The land consists of excellent garden tracts of alluvial soil between the mouths of two streams emptying into the harbor. In the garden are growing pedigreed cultures of mais, oenothera, sunflowers, poppies, clovers, tomatoes, etc.

North of the garden is an acre of land devoted to the rearing of pedigreed poultry. A shed here contains the young stock of the present season. A number of brooders to the south are used for the rearing of young chicks. In the southwest corner of the land is the residence of the Director with accompanying grounds. A flowing well driven to a depth of 180 feet supplies the buildings on the place with excellent water. The main laboratory, finished January 1, 1905, is 60 feet long by 35 feet wide and 21/2 stories high. It contains rooms for administration, private rooms for investigators, a library room, a photographic room and several large rooms for rearing terrestrial and aquatic animals under varying conditions of light, temperature and moisture.



STATION FOR EXPERIMENTAL EVOLUTION, COLD SPRING HARBOR.

All work rooms are provided with running water. The building, which is semi-fireproof, is heated by steam, piped for gas and lighted by electricity.

The building is equipped with the usual laboratory glassware and reagents with a variety of cages and with measuring and calculating apparatus. There are facilities for collecting on land, fresh water or the sea. An herbarium, zoological collections, and records make it posible to learn quickly the contents of the fauna and flora of the neighborhood with a view of getting material for any proposed experimental investigation.

The library of the Station consists of about 200 bound volumnes, including a set of reference books on the different sciences, speculative and practical, works on evolution, including variation, heredity and plant and animal breeding, about 1,500 pamphlets on general biology, morphology and physiology and files of some twenty-five journals and continuations.

The station is used throughout the year by

the following resident staff: C. B. Davenport, Director; G. H. Shull, botanist; F. E. Lutz, entomologist; Anne M. Lutz, cytologist; R. H. Johnson, entomologist and E. N. Transeau, botanist. There are also an animal care-taker, a mechanician and gardener.

The Station co-operates with biologists elsewhere, these "Associates" constituting the non-resident staff of the station.

Through its "correspondents," in this country and abroad, the Station enters into relation with other biologists engaged in the experimental study of evolution, to facilitate exchange of materials and ideas.

In addition to the main building, the plant comprises four greenhouses; one for botanical work and three small ones for work with insects, of these three the eastermost contains experiments with flies, beetles and crickets by Mr. Lutz, and the middle one experiments on Coccinellidae by Mr. Johnson. The western house is used in the winter for rearing green food for the pedigree birds.

The annual budget of the Station is about

\$25,000. In addition to the resident staff of six persons and secretary, there are about nine employees, assisting in the work with the experiments. The scientific papers of the station staff and its associates are published by the Carnegie Institution of Washington in a series of papers of which nine have already

appeared. In addition to the land occupied around the main building there is a tract of seven acres a quarter of a mile distant, of which one acre is devoted to breeding pens of poultry. Two acres are devoted to rearing sheep and goats, and two acres to rearing pedigreed plants. Among the other experiments carried on in connection with the Station may be mentioned a colony of cats in a small house between the residence and the stable; a colony of breeding canary birds and other cage birds located in the south room of the second floor of the main building and a cage devoted to experiments with butterflies adjacent to the vivarium.

NEW YORK STATE FISH HATCHERY.

THIS is the oldest of the three institutions at Cold Spring Harbor, being established in 1887 at the instigation of Mr. Eugene G. Blackford, one of the New York State Fish Commissioners. The present superintendent is Mr. Charles H. Walters. The plant consists of a building with numerous fish hatching troughs and about two acres of ground, which is covered with fish ways. A remarkable supply of water is obtained from springs on adjacent hills and from a flowing well yielding 200 gallons per minute.

During this year the hatchery has hatched 267,000 brook trout, 144,000 rainbow trout, 65,000,000 tom cod, 75,000,000 smelt, 150,000 yellow perch, 8,000 whitefish and 11,000,000 winter flatfish. The fry are distributed to the ponds and streams and marine harbors of the State. The hatchery is one of several establishments of similar pattern operated by

the State of New York.

THE NEW YORK ZOOLOGICAL SOCIETY.

THIS Society was founded in 1895 by a number of public minded citizens and two or three zoologists, including Professor Osborn, Chairman for the first seven years, and Madison Grant, Secretary since the foundation. It had three objects:

- 1. The establishment of a zoological park.
- 2. The preservation of animal life.
- 3. The promotion of zoology.

The active efforts of the Society, which now has a membership of 1,600, chiefly non-zoologists, have been directed first to the park, second to game preservation. The scientific development has been retarded somewhat until these two initial objects could be fully secured. Much scientific work has been done, however; and at the present time scientific research and publication is taking substantial and permanent form.

In 1895 the Zoological Society secured, by a special act of the Legislature, the charter which gave it corporate existence. Active measures for the development of a zoological park were at once begun. From January, 1896, down to the present moment, the progress of the organization has been an unbroken series of successful undertakings.

The first important act of the Executive Committee was to adopt the scheme of basic principles, which was formulated by Professor Henry F. Osborn, on which it was proposed that the Zoological Park should be founded. In March, 1896, Dr. William T. Hornaday was chosen as Director. The site selected and recommended by him was approved, and his preliminary design for the development of the Park was approved on November 27, 1896. While the esthetic treatment of this plan has been submitted to and modified by various experts, the original scheme has been adhered to very closely.

On March 24, 1897, the Society entered into a formal agreement with the City of New York of far-reaching consequence. The present grounds of the Zoological Park were formally allotted to the Society for the purposes to which they are now devoted. The Society received a control of the grounds that is practically absolute; and on its part it agreed to expend on the Zoological Park, within

three years, at least \$250,000.

On November 22, 1897, an elaborate and carefully studied "Final Plan" was submitted to the Mayor and the Commissioners of Parks of the City, and was duly accepted and signed by them. It showed the Zoological Park as the Society intended that it should be when finally completed. The result of this New York idea for the creation of a great zoological park, free to all the people, is now visible to the world, and by description it is briefly set forth elsewhere in this BULLETIN.

Through the liberality of the persons composing the Zoological Society, and the confi-

dence reposed in them by the city authorities, the results now visible in the Park have been accomplished in nine years, and in two years more this great task will be finished, according to the requirements of the "Final Plan."

Because of the Zoological Society's satisfactory business methods in connection with the Zoological Park, the City Department of Parks, in 1902, requested the Society to assume control of the New York Aquarium, and place it upon a permanent scientific basis. Its growth and its character to-day are testimonials to the wisdom of the action of the

Park Department. In the cause of "Game Protection," which is a short term comprehending all efforts for the preservation of wild life, the Zoological Society has put forth an amount of effort, and expended money far beyond anything of the kind ever accomplished by any similar organization so far as we are aware. The first work of the Society in this field consisted of an inquiry by Dr. Hornaday, in 1898, into the decrease in bird life throughout the United States during the previous fifteen years. Secretary Grant was largely instrumental in the passage of the Alaskan Game Law and the Newfoundland Game Law, and in defeating the attempted repeal of the Alaskan Game Law. Mr. G. O. Shields, for two years the Society's Special Agent for Game Protection, completely stopped the wholesale slaughter of song birds for food that was going on in the northern portion of New York City, by Italian laborers. Dr. Hornaday proposed to the Zoological Society and the United States Government the plan that now is being carried into effect for the establishment of a national herd of American Bison in a specially equipped range on the Wichita Forest and Game Reserve, in Oklahoma. During the spring of 1007 Professor F. W. Hooper and Dr. Hornaday successfully advocated before the New York Legislature the American Bison Society's bill for the establishment of a state herd of Bison in the Adirondacks. In 1901 Miss Caroline Phelps Stokes conveyed to the Zoological Society a fund of \$3,000—the interest of which is to be used perpetually for the protection of birds. Aside from this, the Society, and its members individually, have jointly expended in the cause of game protection, through the Society's officers; during the past five years, at least \$6,000.

INVESTIGATIONS.

Owing to heavy burdens involved in the creation of the Zoological Park, and in taking

an active part in the preservation of our wild fauna, the Zoological Society has just begun its serious and extensive work in the field of scientific investigation, save in its medical department. In that field, the studies of Dr. Blair and Dr. Brooks have been of great value to the Society and to the world of comparative medicine and surgery as a whole.

Curator Beebe has by a series of experiments established the fact that through unusual humidity of the atmosphere, the plumage of a bird can be completely changed in color to very dark hues, during the short period of three years and two successive moults. These will be published in *Zoologia*, the new scientific periodical of the Society.

In the Annual Report and Bulletin of the Society there have been published numerous scientific papers, and others of popular natural history, of special interest to the members of the Society.

THE NATIONAL COLLECTION OF HEADS AND HORNS.

In December, 1906, Messrs. Grant and Hornaday proposed that the sportsmen of America should form a great National Collection of Heads and Horns, provided the Zoological Society would accept the ownership of it, and permanently maintain and exhibit it in the Zoological Park. This offer was immediately accepted, and the collection is now rapidly being formed. Already gifts have been received having an aggregate value of about \$11,500.

Hon. Levi P. Morton is President of the Zoological Society, Professor Henry Fairfield Osborn is First Vice-President, and Mr. Charles T. Barney is Chairman of the Executive Committee.

The total sum contributed by private generosity, through the New York Zoological Society, is now about \$460,000, not counting miscellaneous gifts of animals, the total value of which never has been computed.

OTHER SCIENTIFIC SOCIETIES OF NEW YORK.

THE New York Academy of Sciences is fourth in age among American scientific societies, having been organized in 1817 as the Lyceum of Natural History of New York. Its Active Members number about 500. It also has several hundred Associate Members including the membership of the following af-

filiated societies; viz.: Torrey Botanical Club, New York Microscopical Society, New York Mineralogical Club, New York Entomological Society, Brooklyn Entomological Society.

Linnaean Society of New York.
Its Honorary Members are limited to fifty and are elected from representative scientific men of the world. Fellows are chosen from among the Active Members in recognition of scientific attainments or services. The publications of the Academy at present consist of two series, the "Annals" (octavo), and the "Memoirs" (quarto). The Academy meets in four Sections, one of which is the Section of Biology, including Zoology, Botany and Physiology. The meetings of the Academy, its Sections and of the affiliated societies are nearly all held at the American Museum of Natural History, and are announced to members by means of the "Bulletin of the New York Academy of Sciences and Affiliated Societies," issued weekly from October to May inclusive. The library of the Academy (11,-000 volumes) is united with that of the American Museum of Natural History. The President of the Academy is Dr. N. L. Britton.

The Section of Biology is under the chair-manship of Professor H. E. Crampton, of Columbia University, and Mr. Roy W. Miner, of the American Museum of Natural History.

is its Secretary.

The Linnaean Society of New York was organized in 1878, and has a membership of 152. It publishes "Transactions" and "Abstract of Proceedings." Its Library consists mainly of exchanges derived from publications. The activities of this Society are directed chiefly along zoological lines, being to a considerable extent ornithological.

The President of the Society is Mr. Jonathan Dwight, Jr.; the Secretary Mr. C. G.

Abbot.

The National Association of Audubon Societies is a corporation for the protection of wild birds and animals, and is primarily a federation of the State Audubon Societies, of

which there are now thirty-nine.

The general offices of the National Association are at 141 Broadway, New York, and the President is Mr. William Dutcher, of New York. The funds to carry on the work are secured from membership dues, donations and interest from invested funds derived from legacies.

The objects of the National Association are

as follows:

"To hold meetings, lectures and exhibitions in the interest of the protection of birds and

animals, and to use all lawful means for the protection of birds and animals."

"To publish and distribute documents or other printed matter on these or other subjects, and acquire and maintain a library."

"To co-operate with the National and State Governments and regularly organized Natural History Societies in disseminating knowledge relative to birds and animals."

The State Societies are each of them under an entirely independent management, but all have representation in the management of the

National Association.

The headquarters of the New York State Audubon Society is at the American Museum of Natural History; the President of the Museum being also the President of the State Audubon Society.

The New York Entomological Society was organized in 1892. It has a membership of 143 persons, and publishes the "Journal of the New York Entomological Society," now in its twelfth volume. Mr. Charles W. Leng is the President, and Mr. H. G. Barber, Re-

cording Secretary

The New York Microscopical Society was incorporated in 1877, and has a membership of 68. Meetings are held at the Mott Memorial Library, 64 Madison Avenue, New York. where there is a Library of about two thousand volumes. The Cabinet contains about five thousand specimens. It publishes the "Journal of the New York Microscopical Society," which is now an annual publication.

Mr. F. Y. Leggett is President and Mr. James H. Stebbins Recording Secretary

The Brooklyn Entomological Society was organized in 1872, and has a membership of It formerly published the "Bulletin of the Brooklyn Entomological Society," 1878-1885, and "Entomologia Americana," 1885-1890. The President is Dr. John B. Smith, and the Recording Secretary, Mr. A. C. Weeks.

The headquarters of the Society are at 55 Stuyvesant Avenue, Brooklyn, where there is a library of about five hundred volumes.

The Brooklyn Conchological Club was organized in 1900, and has 20 members. The formation of collections is still in the hands of private parties, who exchange. Mr. Silas C. Wheat is the President and Mr. C. Dayton Gwver the Secretary.

The Staten Island Association of Arts and Sciences, at New Brighton, Borough of Richmond, was incorporated by act of the New York Legislature May 17th, 1905, as the successor of the Natural Science Asociation of Staten Island, established in 1883. The latter published volumes of Proceedings. The new organization has commenced the publication of a second series of Proceedings, and will also issue Memoirs, containing more elaborate monographs.

The Association has an excellent general collection of local material, and under the terms of its charter, enabling it to receive municipal appropriations for equipment and maintenance, expects soon to establish a public museum chiefly for the benefit of the people of Richmond Borough. Its collections are

still small.

With the transfer of the museum in the near future to its permanent quarters in the new Borough Building special efforts will be made to enlarge the biological collections and establish an interesting and valuable exhibition series. The library of the Association, perhaps its most valuable asset, contains many complete files of periodicals and serials, being especially rich in those devoted to entomology.

The President of the Association is Mr. Howard Randolph Bayne, the Secretary Dr. Arthur Hollick. The administration of the museum and library is vested in the Curator, Mr. Charles Louis Pollard. Pending the removal to the Borough Building the collections are stored in the Staten Island Academy at

New Brighton.

The American Bison Society was organized in 1906 for the purpose of promoting the perpetual preservation of the American Bison. It is the belief of its members that this end can be assured only through national and state ownership of several herds breeding and roaming free in very large ranges. The effort of the Society to secure the establishment of a New York State herd, located in the Adirondacks on a range embracing about twelve square miles of grazing grounds, came very close to achieving success. The Society's measure was passed, unanimously, by both houses of the New York legislature, but was most unexpectedly vetoed by Governor Hughes, without a hearing.

The Society is now actively engaged in making a thorough examination of the Flathead Indian Reservation, in northwestern Montana, with a view to the establishment

there of a national herd.

The active officers of the Society are Dr. William T. Hornaday, President; Professor Franklin W. Hooper and Mr. A. A. Anderson, Vice-Presidents; Mr. Ernest H. Baynes, Secretary, and Mr. Clark Williams, Treasurer.

ZOOLOGISTS OF NEW YORK AND VICINITY.

ABEOTT, CLINTON G.

Secretary, Linnaean Society of New York, 153 West 73d Street, New York.

ALLEN, JOEL ASAPH, Ph.D.

Curator, Mammalogy and Ornithology, American Museum of Natural History, Editor "The Auk."

American Mammals and Birds: Geographic Zoology.

BARBER, HARRY G., A.M. Instructor in Zoology, DeWitt Clinton High School, Columbia University,

BEAN, TARLETON HOFFMAN, M.D. State Fish Culturist of New York, I Madison Avenue, New York Ichthyology, Pisciculture.

Beebe, C. William.
Curator of Birds, New York Zoological Park.

BEUTENMULLER, WILLIAM.

Curator, Department of Entomology, American Museum of Natural History

BIGELOW, PROF. MAURICE ALPHEUS, Ph.D. Professor of Biology, Teachers College, Columbia University. Zoology.

BLAIR, W. REID, D.V.S. Veterinarian, New York Zoological Park.

BRISTOL, PROF. CHARLES LAWRENCE, Ph.D. Professor of Zoology, New York University. Zoology.

Brown, Barnum.

American Museum of Natural History Vertebrate Paleontology, Reptilia, Pleistocene Mammalia.

Bumpus, Hermon Carey, LL.D., Sc.D. Director, American Museum of Natural History. Zoology.

Calkins, Prof. Gary Nathan, Ph.D.
Professor of Protozoology, Columbia University.
General Cytology, Protozoology.

CATTELL, PROF. JAMES MCKEEN, Ph.D., LL.D. Professor of Psychology, Columbia University, Editor of "Science" and of the "Popular Science Monthly," Garrison-on-Hudson, N. Y. Psychology.

Call, Richard Ellsworth, M.Sc., Ph.D. Teacher of Biology, DeWitt Clinton High

Conchology, Ichthyology.

CHAPMAN, FRANK MICHLER, Associate Curator, Ornithology and Mam-malogy, American Museum of Natural History, Editor "Bird Lore." Birds, Geographic Distribution, Life Histories.

CHERRIE, GEORGE KRUCK.

Curator, Department of Ornithology, Museum of the Brooklyn Institute, Eastern Parkway, Brooklyn, N. Y

Mammalogy and Ornithology,

CHUBB, SAMUEL H.
American Museum of Natural History.
Osteologist and Preparator.

CLARK, JAMES L.
American Museum of Natural History.
Mammalogy, Taxidermy.

CRAMPTON, PROF. HENRY EDWARD, Ph.D. Professor of Zoology, Barnard College, Columbia University. Experimental Biology.

CURTIS, JOHN GREEN, M.D., LL.D.
Professor of Physiology, College of Physicians and Surgeons, Columbia University.
Physiology.

DAHLGREN, B. ERIC, D.M.D. Assistant Curator Invertebrate Zoology, American Museum of Natural History. Invertebrate Zoology.
DAVENPORT, PROF. CHARLES BENEDICT, Ph.D.

DAVENPORT, PROF. CHARLES BENEDICT, Ph.D.
Director, Station for Experimental Evolution,
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Harbor, Long Island, N. Y.
Zoology, Experimental Evolution.

DAVENPORT, MRS. GERTRUDE CROTTY.
Station for Experimental Evolution, Cold Spring
Harbor, Long Island, N. Y.
Zoology.

DEAN, PROF. BASHFORD, Ph.D. Professor of Vertebrate Zoology, Columbia University, Curator of Fossil Fishes, American Museum of Natural History. Vertebrate Morphology, Ichthyology.

DITMARS, RAYMOND LEE.
Curator of Reptiles, Assistant Curator of Mammals, New York Zoological Park,
Herpetology.

Assistant, Museum of the Brooklyn Institute, Eastern Parkway, Brooklyn, N. Y. Lepidoptera. Dublin, Louis I., Ph.D.

DOLL, JACOB.

Instructor, College of the City of New York.

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Membership in the Zoological Society is open to all persons interested in the objects of the organization who desire to contribute toward its support and are endorsed by two members in good standing. In order to carry out all its plans, the Society desires to increase

its membership to a total of 3,000. The cost of annual membership is \$10 per year, which entitles the holder to admission to the Zoological Park and the Aquarium on all pay days, when he may see the collections to better advantage than on other days. Members are entitled to the Annual Report and all Bulletins, admission to all lectures and special exhibitions, and ten complimentary tickets to the Zoological Park, for distribution. The annual membership fee is payable on May I of each year, in advance.

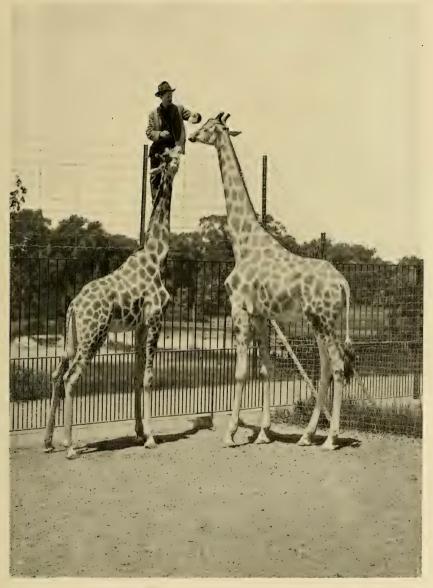
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to the Chief Clerk at the Society's office in the Zoological Park or forwarded by mail to Madison Grant, Esq., General Secretary, No. 11 Wall Street, New York.

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NUBIAN GIRAFFES IN THE NEW YORK ZOOLOGICAL PARK.



BIRD'S-EYE VIEW OF THE CITY OF NEW YORK AND VICINITY.

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January, 1908

NEW RARE BIRDS IN THE ZOOLOGICAL PARK.

By C. WILLIAM BEEBE.

THE shipment of birds which was received from the London Zoological Gardens early in August, 1907, in exchange for a representative lot of living American birds, contained many species of unusual interest, a number of which were new to the collection of the Society and which in some cases had never been brought alive to this country before.

One of the rarest and at the same time most sinister looking is the lammergeier or bearded vulture of the mountain fastnesses of Europe, Asia and Africa. Our specimen is not quite full grown, but in another year, when adult.

it will measure nearly four feet in length and its wings spread to a width of full eight or nine feet. This will make it a much larger bird than any of our eagles. The name lammergeier means lamb vulture and is well bestowed, for among the mountains it is a deadly foe of shepherds and takes heavy toll from their flocks of sheep. Besides lambs and goats, this fierce bird also feeds on the chamois and when pressed by hunger will not disdain carrion. It thus shares the habits of both the vultures and eagles, although it is more closely related to the latter group of birds.

The lammergeier is the bird which is fa-



THE ULTRAMARINE OR HYACINTHINE MACAW

mous or rather notorious in the folk-lore of many European countries. Although the great majority of stories of eagles which attack human beings are based on myths, yet there are authenticated cases of deaths from the rush of this bird of prey. Its method of attack is as follows: When a lamb is browsing near the edge of a precipice, a lammergeier will swoop down from empty space with a terrific rush, striking the animal with its feet and hurling it headlong to the rocks beneath. A child, or even a man, standing near the edge of some great mountain abyss would have little chance of avoiding such an unex-

pected assault from the air above.

The fierce appearance of the bird is increased by the eyes, the irises of which are light orange, surrounded by a band of brilliant scarlet, giving a permanent bloodshot look, which adds a unique character to the bird's head. Shepherds have systematically poisoned this bird until it has disappeared from the Swiss Alps and many other places in Europe. It is still found in Persia, Palestine and the Himalayas. The name "bearded" is appropriate because of the tuft of black. bristle-like feathers extending downward and forward from the chin. The lammergeier is gravish-black above and tawny-orange below. while the crown and sides of the face are white. A single egg is laid in February, on an enormous pile of sticks placed in a cleft of some inaccessible cliff.

Not the least curious trait of the lammergeier is its fondness for bones. It is not the marrow which attracts the bird but the substance of the bone itself. The small bones it swallows whole, and when it can secure them, good-sized splinters of large bones are also taken with the greatest apparent relish. They are soon digested, and, no matter how sharp, seem to cause the lammergeier no in-

convenience whatever.

Far less in size, but in its way of quite as great interest, is the hoopoe, a bird no larger than a robin, which we may see in its cage, sitting quietly on its perch with head and wings drawn in closely, and showing so little of any unusual appearance, that the average visitor would hardly give it a second glance. But, when it leaps into the air and suddenly takes a short flight about the cage, a remarkable change takes place. A tall slender crest shoots upward into a wide spread fan of feathers, barred with orange, black and white, and the same colors blaze forth from its expanded wings. As it hovers in mid-air, the wings beat rapidly, forming a haze of bright color about the body, while the head is turned from side to side, exposing the crest in all directions. The general appearance is of a large and brightly colored butterfly. Then it slowly sinks to rest on the perch or on the ground, and quickly alights, shutting wings and crest. and as a candle is snuffed out by the wind, so do the colors vanish, and in their place is a small ball of sand-colored feathers, hardly distinguishable from the surrounding gravel. The little mound of drab and gray might, in a field, be taken for one among a hundred similarly-hued clods or stones. The transformation is magical, and as astonishing as if there were actually two very different species of birds in the cage, differing radically in color

and temperament.

The hoopoe nests over much of Europe and Siberia, and in winter migrates south to Africa. Although so beautiful in appearance, its nesting habits are anything but pleasant, and its nest usually is a dirty, ill-smelling affair. In the interest of its relationships it makes up for this. A study of its anatomy leaves no room for doubt, that it claims close kin with the gigantic-beaked hornbills. The bill of the hoopoe is long, slender and curved, well adapted for probing in the soil for grubs and earth-worms, and we can compare it with the enormous appendage of the hornbill only to show how unlike the bills of two related birds can be. Even in the action of eating, the affinity is suggested, for the hoopoe throws its food into the air and catches it with a swallow as in the case of the hornbill. Again, as the latter bird walls in its mate while she is sitting on the eggs, and faithfully feeds her throughout the entire period of incubation, so the hoopoe carries food to his mate while she is on the nest, a habit not common among birds, especially before the young are hatched. Hoopoes are rare in captivity as they are delicate and hard to keep in health, but the bird at the Zoological Park seems to be strong and well, after six months of residence in the new Bird House, The common name is given on account of the cry of the bird and the German name wiederkopf refers to the constant jerking motion of the head and neck. The scientific name is *Upupa cpops*, the first being the word which the Romans used to indicate the call note of the bird, and the latter being the Greek name for the bird itself.

Another bird which because of its rarity in addition to its strange appearance is a notable accession to the collection is a magnificant ultramarine or hyacinthine macaw. This bird is seldom seen in captivity alive, and when one comes into a dealer's hands, it commands from one to two hundred dollars. Little is known

of its habits in a wild state, but it is said to lay two white eggs at the end of a burrow scraped out of the side of a steep bank overhanging a stream. This macaw is the largest of its family and is wholly of a deep blue color. At the base of the bill and around the eyes are small patches of brilliant yellow, and the tongue is stained with the same hue. enormous beak is black, dwarfing the huge mandibles of any other species of macaw. When it really wishes to escape from its cage, the strongest wire generally gives like pack thread, and the thickest hardwood perch is reduced to sawdust in an incredibly short period of time. But strange to say, with all this mighty strength, the bird shows a quietness of disposition and lack of ill temper which is unusual among its near relations. hyacinthine macaw in the Zoological Park enjoys being fondled and caressed by its keeper, and if carried around on the hand, never, without provocation, attempts to fly away or to nip hard. Altogether, it is a most delightful inmate of the Bird House, and there is ever an admiring throng about its cage. It seems to enjoy this publicity, and revolves slowly on its perch, showing off all sides of its wonderful plumage. Sometimes it secures a firm grip with feet and bill and vibrates its wings so rapidly that they become a bluish haze, calling out all the while in the thick and almost human utterances of its own strange vocabulary, the untranslatable language of the macaws.

Of all the thousands of living birds now in the collection of the Zoological Society, the most beautiful, perhaps, are a pair of whitecrested touracous. And unlike some ornamental creatures, they are as interesting as they are exquisite in color. The plumage is a rich grass green with a large patch of vivid scarlet on each wing, and a stiffly erect crest tipped with a delicate brush of white. Every movement is full of grace, and from their slender necks to their well-proportioned feet they are creatures of beauty which it is a delight to watch. Their position in classification has long been a matter of dispute, but true to their character of two toes in front and two behind, they are now usually placed near the cuckoos, with a strong leaning in the direction of the parrots, although they are absolutely unlike these latter birds both in appearance and actions. The most interesting thing about them lies in the red color of the larger wing feathers, this hue taking up a considerable portion of each side of the vane of the feathers. When the birds bathe, this pigment sometimes tinges the water a slight rose color, a remarkable

fact when we realize how permanent and difficult of extraction the pigments of birds' feathers usually are. When the proper succession of acid and alkali are used, this red color of the touracous' wing can be extracted and precipitated in the form of a bluish-green powder and we find that it is nothing more nor less than pure, metallic copper. In no other organic compound in the world is copper known to occur thus as a pigment. The percentage is from 6 to 10 per cent. It burns with a greenish flame before it is taken from the feather, and in fact all its other reactions are those of copper, as truly as any of the metal mined and incorporated in coin or other manufactured articles.

The source of this metal in the bird's wing is unknown, although it has been suggested that in a wild state the touracou picks up pieces of copper or malachite with the grit which they swallow to aid them in grinding their food. A much more probable explanation is, that bananas, of which these birds are very fond, contain traces of the metal, and that by the accumulation of this, sufficient is stored up in the dermal tissues to produce the required percentage in the wing feathers. if one such remarkable fact were not enough, abundant traces of iron have been found in the green portions of the plumage, so that these birds are metal extractors in more than one way.

About twenty-five species of touracous are known and all live in Africa, but only a few of these have the coppery-red color in the wings. Some have white patches where this color is located in the others. In the Zoological Park, the Curator of Birds has extracted the metal from one of these feathers and has placed it on exhibition in a wall case in the Glass Court. Thus, in the same house with the living specimens of touracous, is shown the normal feather, the pale feather from which the color has been taken, and finally two small vials of the precipitated copper itself.

Three penguins from South Africa, via the London Zoo, are now living in perfect health in the Zoological Park, and seem to thrive under the new arrangement of keeping them outdoors. They have a wind-break of glass, and a tiny stone igloo into which they delight to go and sit quietly for a few minutes, getting up suddenly and waddling out comically as if they had forgotten something.

What the seals are to the mammals, penguins are to the bird world, having given up flight and taken to the sea. Their feathers have

lost all softness and have become small, horny, and in general scale-like. The wings have assumed, in rigidity, shape and movement, the appearance of shark fins, and by means of these strangely altered appendages the penguins fly swiftly through the water and capture the fish on which they feed. Their eyes are flat and fish-like, such a structure enabling them to see more distinctly under water. All penguins are found south of the equator, and the great majority inhabit the frigid Antarctic regions.

Jackass penguins nest in large colonies on the coast of South Africa, sometimes hundreds close together on one island. At a distance they bear a close resemblance to diminutive human beings, and their fearlessness of man makes it seem as if they considered him as only a larger harmless edition of themselves. Two eggs are laid in a burrow in the sand or among a few shreds of sea-weed. Their voice is a hoarse, barking bray, from which fact they have derived their common name.

In captivity, penguins are most amusing, waddling about in their upright, comically human manner, or diving after live fish in the glass feeding tank. When swimming they are very seal-like, the webbed feet being laid flat together and used as a rudder to make quick turns, while the wings are used altogether to keep up the wonderful speed which

they can attain in this element. No more curious or un-birdlike feathered creatures will ever be seen in our city, and those which are now living in the Zoological Park are alone well worth a visit to see.

A complete count of the birds in the collection of the Zoological Park is a matter which takes considerable time, and is not undertaken until the last day of the year, when the annual census of species and individuals is made. A system of monthly records enables the Curator to report that up to December 1, 1907, the yearly record has been an unusual one. The death rate for the past eleven months is just one-half that for the year of 1006.

While no new installations have been made, yet the collection shows a steady increase, both in species and individuals. One year ago there were 491 species of living birds represented in our collections; now there are considerably over 520. Against 2,104 specimens of birds last year, the Park now contains over 2,400 individuals—probably the largest and most representative collection of living birds in the world. Details of the year's progress in the bird department will be printed in the forthcoming twelfth Annual Report.

C. W. B.



THE NATIONAL BISON HERD.

An Account of the Transportation of the Bison from the Zoological Park to the Wichita Range,

By ELWIN R. SANBORN.

AFTER a lapse of many months, the National Bison Herd has become an accomplished fact, and the energy and perseverance of the Director at last realized in the establishment in the Wichita Preserve

of fifteen of the Zoological Park's finest bison.

*In 1905, an agent of the Society visited the Wichita National Forest and Game Preserve to select a suitable location for a range. The conditions proved to be all that could be desired, and Mr. Loring's enthusiastic description of the wonderful possibility was a powerful incentive to the consummation of the plan.

The problem of successfully shipping these ponderous animals such a tremendous dis-

^{*}Report of the New York Zoological Society for 1905,



A SHUTE FIFTY FEET IN LENGTH HAD BEEN ERECTED.

tance, was one of the utmost importance. Experience had shown that animals, confined in small crates, ride uneasily and with serious results, often reaching their destination tired, emaciated, and wholly off their feed, with bruised flesh and sore bones, which necessarily must be overcome. An inspection of the various crates in which specimens had been received at the Zoological Park, indicated that most frequently the animals could neither recline nor stand with perfect freedom, and often were ill-fitted to journey hundreds, perhaps thousands of miles, with the never failing delays.

The Director planned a series of crates, which would in every case be comfortable for each individual, and these were constructed after his ideas. Each crate was large enough to permit its occupant to lie down comfortably, and was carefully padded to relieve the inevitable jolting.

The Park herd was trained to the hour, and its members were as fine and healthy as human ingenuity and good food could make them. The animals had been selected months before their actual shipping time.

The work of rounding-up the herd was commenced in October, upon the arrival of Mr. Frank Rush, the Government agent, who was to accompany the bison on their long journey, and the work of separating the selected stock from the main herd proceeded with precision and dispatch under Keeper McEnroe. A chute, fifty feet in length, had been erected between the two main corrals fronting the Buffalo House, communicating with both and terminating with a very ingenious sliding iron gate. Against this gate the crates were placed. The herd of fifteen was driven into the north corral, and the animals, one at a time, liberated into the chute. As soon as each bison was selected, the properly marked crate, designated for this particular specimen, was fastened into position adjacent to the Most of the animals were sliding-door. rushed down and into the crate before they could realize it. Occasionally one became obstreperous and delayed proceedings by hurdling and various other tactics, but from eleven o'clock until five of Thursday, October 10th, thirteen were crated and loaded into the cars at Fordham. On Friday, the last two were disposed of, and by noon of that day the last crate was placed in position in the cars. The Arms Palace Horse Car Company, of Chicago, furnished two forty-four foot cars,



TWO ARMS PALACE HORSE CARS WERE FURNISHED.

of the type used for transporting fancy stock. These were equipped with collapsable stalls, and water-tanks capable of holding water sufficient for the trip. The cars were arranged with high and low speed air-brakes and steam connections. And no one would have dared to believe that such inoffensive apparatus could make as much trouble as those several bits of hose swinging from either end eventually did.

Through the late Charles T. Barney, Esq., Mr. Dudley Evans, President, and Mr. H. B. Parsons, Vice-President of the Wells-Fargo Express Company agreed to transport the cars free of charge from St. Louis to Cache, Oklahoma, on account of the public interest in the shipment.

Mr. James C. Fargo, President of the American Express Company, was then advised of their offer, and at once decided that he would also do the same, provided the New York Central would concur. This President Newman promptly conceded on behalf of his company.

These arrangements having been quickly and satisfactorily arranged, the cars were stored with hay and water for the animals, provisions and blankets for the attendants. On Friday night they were attached to train No. 37, of the Central's fast passenger service, in charge of Chief Clerk Mitchell, and the long journey began.

We signed our lives away to the Express

Company and secured accident policies at the Grand Central Station, for four days' duration, to balance the account.

It was a bit awe inspiring, a train of thought superinduced no doubt by our reckless barter, to realize that in the midst of this vast station with its multitudes of people, its coughing, booming trains, in the center of the greatest city of the new world, were fifteen helpless animals, whose ancestors had been all but exterminated by the very civilization which was now handing back to the prairies this helpless band, a tiny remnant born and raised 2,000 miles from their native land. Surely the course of Empire westward takes its way.

But sentiment is forgotten when at the conductors' "all-aboard," we clamber into Arms Palace Horse Car 6026, and in the dim light of a swinging oil lamp with the accompaniment of rumbling wheels and snorting bison, realize we are at last actually in motion. When we close the side doors and throw over the cross bar, we are cut off from the outside world entirely. No bell rope, no signal of any kind! Enthusiasm is at its lowest ebb, 2,000 miles from our journey's end, and anticipations only to buoy our hopes. As the train gathers speed, the clanking chains clash against the floor of the car, the partitions of the collapsable stalls thud dismally together, and the upper works in general creak and groan in the most cheerless way. It is then that we realize how very comfortable must



THE BISON CRATES ON THE WAGONS AT CACHE.

be the "Pullmanites." Smoking would be a solace, but is out of the question. A fire once started in the midst of all that dry hay, fanned by sixty miles of speed, we would be hurled furiously through the darkness of the night a seething mass of flame, for we were then as helpless as the bison themselves. No exit for us except by flying, and no ingress for others, unless they adopted the same means. Very soon we left the yards and dropped into a steady roll, plunging through the night along the banks of the Hudson, occasional glimmers of the water showing through the glass covers of the crated doors. Every swing of the train was echoed by hoarse remonstrances from the bison.

An ample space at the head of the car had been partially filled with bales of hay, and at ten o'clock we made up our bunk there, as there seemed little else to do. Mr. Rush decided to try an upper berth, as he facetiously termed it, on the tops of two of the crates, and by spreading his blankets there upon a pile of hay, composed himself at a right angle to our direction, with true western resignation to all sorts and conditions of things. With more hay, Mr. Mitchell and I laboriously constructed on the floor a bed of voluminous proportions and turned in. I can boast all my life of having slept within seven-

eighths of an inch of an American bison. He resented it, and betraved his feelings by stealing our bed; not all at once, but piecemeal. Very dexterously thrusting his flexible tongue through the openings of his crate, he would carefully get a firm hold on a wisp of hav and wait until I slept, then give a good, healthy pull. I could feel that rope of hay start at my feet, and gradually extend itself with a snaky motion to the wisps which curled over the blankets at my head. After six or seven of these alarms, I made a rapid calculation of the number of hours I actually could sleep before striking bottom, and by dividing the pile of hay by his capacity, figured that I could just reach morning by throwing in gunny-sack-full which we the "pillow."

We awoke in the morning many miles from Buffalo in a raw, cold air. We were thoroughly employed, caring for stock, until the train rolled into Buffalo, and it was a great relief to have the animals contentedly feeding, and to find them enduring the journey so well.

The wisdom of the Director, in making roomy crates, was more than abundantly manifest even so early in the journey, for with but one or two exceptions, the animals were lying down. The big bull stubbornly resisted this

Continued on page 406.

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By the death of Mr. Charles T. Barney, the Park has lost a valued friend, and the Society an energetic member. Mr. Barney's interest and enthusiasm were strong factors in the later development of the Zoological Park, and in recognition of his work, the Executive Committee of the Zoological Society, at a meeting on November 21, 1907, passed the following resolution:

"Charles Tracy Barney, who died at the City of New York, November 14, 1907, became a member of the original Board of Managers of the New York Zoological Society in 1895. In 1900 he was elected a member of the Executive Committee, and in 1904 was elected Chairman of the Executive

Committee, an office which he filled with great enthusiasm and a generous expenditure, both of time and of money, until he was suddenly taken away from us.

"He was always most liberal minded, most hospitable to new ideas, and kept before him at all times a large conception of the park as an ideal civic institution for the pleasure and education of the entire public. Such a conception of the duties of citizenship commands our lasting gratitude and justly entitles him to a lasting appreciation on the part of the citizens of New York.

"His fellow members on the Executive Committee desire to record their deep sense of personal loss, and their warm appreciation of his services to the Zoological Park and to the Zoological Society."

AN INTERESTING TOAD.

We have all heard stories of toads and frogs that have been exhumed from crevices below ground where they have apparently been prisoners for an indefinite period of The point years, without air, food or water. that renders these stories most unusual is the mystery as to how the batrachians might have been thus imprisoned. The writer must confess, that up to a few weeks past, he was always sceptical in digesting stories of the kind. He has repeatedly received communications relating to toads being disclosed when tree trunks were cut into sections, or others relating to frogs being blasted out of rocks. On all occasions he has responded to such communications by a request for the liberated specimens—but without success.

From Butte, Montana, however, there recently came indisputable record of a toad exhumed from limestone, at a depth of 150 feet from the surface. In this case, the man making the discovery was a thoroughly practical mining engineer. He saved the toad, sent it to the Reptile House for identification, and we are thereby instructed that at least one species of North American batrachian gets into strange predicaments. It is interesting to note that the creature figuring in this case rep-

resents a species of pronounced subterranean habits—the spade foot toad, Scaphiopus hammondi.

It is to Mr. Charles A. Van Zandt, of Butte, Montana, that the Society is indebted for the opportunity of examining the interesting specimen. During mining operations, Mr. Van Zandt was sinking a shaft into limestone formation. At a depth of 150 feet, during progress through apparently solid rock, the toad was exhumed. Mr. Van Zandt personally took the specimen to his home and placed it in a porcelain crock. Here it remained for seven months, refusing all food. A representative of Mr. Van Zandt coming to New York reported the matter to Dr. Louis P. Gratacap, Curator of Mineralogy in the American Museum of Natural History. Dr. Gratacap considered the matter so extraordinary that he at once referred the matter to the Park with the result of communication with Mr. Van Zandt.

The spade-foot toad is yet living in the porcelain jar, in which he has contentedly nestled for eight months. He steadily refuses food, but appears to be vigorous and in good health. He is much paler than the normal specimens his colors having possibly faded from his imprisonment-as to the duration of which we have no idea. Animals that normally dwell in perfect darkness—like those frequenting under-ground rivers-are always practically colorless, but their pale hues are the result of extended evolution. It would be purely theoretical of course, and rather sensational, to declare this toad to have been imprisoned in the rock so long that its pattern faded. However, circumstances point to just those conditions-and the refusal of food may be caused by a partial or total lack of vision. Regarding the habits of the spade-foot toad, Miss Mary A. Dickerson writes*:

"It burrows into the ground and sleeps days or weeks, perhaps years, at a time. A gravedigger once found one three feet two inches from the surface of the ground, with no evident exit to the burrow. . . . Except during the breeding season, the spade-foot is found only by accident. It sits in its burrow, showing only its peculiar golden eyes at the doorway. The turnip-shaped burrow is about six inches long and somewhat oblique in position. The earth on the interior is hard and smooth, packed into this condition by a continued energetic turning-about on the part of the owner of the burrow."

R. L. D.

AFTER a wait of nearly nine years, the rare matamata—the strangest of turtles—is at last on exhibition in the Reptile House. Three specimens have been deposited by the Brooklyn Institute of Arts and Sciences. They were collected in a tributary of the Amazon by Mr. George K. Cherrie, Curator of Birds and Mammals in the Brooklyn Institute.

Owing to the importance of the matamata as an exhibit in a collection of living reptiles, a special tank, with plate glass sides, has been constructed, and the finest specimen thus exhibited. As it is difficult to induce this species to eat anything but live fish, the feeding of a matamata is a highly interesting process and may be observed to the best advantage in a commodious glass tank. While lying upon the bottom, with its huge, flattened head twisted sideways, it is the personification of sluggishness. If a minnow passes within range of the creature's vision, however, the mass of tentacled head and neck is reared slowly, then comes a dart of such rapidity the human eye is unable to follow the movement. The fish appears to voluntarily leap down the turtle's throat—owing to a suction created when the capacious jaws spring open.

In appearance of shell, the matamata is not unlike the big Mississippi snapping-turtle. The shell is mud-colored, and rises in coarse, serrated ridges. Most remarkable about the reptile are the head and neck. The head is triangular, terminating in a long, tubular snout, but the entire organ, including the neck, is as flat as if squeezed under strong pressure. Added to the grotesque make-up, is a fringe of flattened excrescences on each side of the head and neck. Incidentally, the head cannot be drawn back into the shell, but is tucked in sideways in time of danger. The members of the family of which the matamata belongs are called the side-necked turtles. The technical name for the family is the Chelydidae.

In habits the matamata is much like the snapping-turtle. It is strictly aquatic, lying on the bottom of muddy rivers, where the rough surface of the shell and the excrescences on the neck give it an appearance not unlike a chunk of derelict timber. Lying in wait on the bottom, the waving fringes on the neck probably attract passing fishes that are captured by a dart of the head. R. L. D.

THE MATAMATA.

^{*} The Frog Book, Doubleday, Page & Company, New York.



THE CARAVAN LINED UP ON THE PRAIRIE AT THE CORRALS.

Continued from page 403.

provision for many hours, but before we reached Cleveland, he was glad to make use of it and stretched himself out with a grunt of satisfaction which was more expressive than words. We rolled into Buffalo late in the forenoon and gladly leaped out of our airy quarters to attend the needs of the animals in the rear car. Here we encountered the first obstruction to our journey, which afterwards occurred so frequently that it became a habit. The inspectors blandly reported to us that the steam-hose had been pulled off in the night and the bolts in one of the brakebeams had loosened, almost dropping it to the level of the rails. The cars must be run into the cripple track and jacked up, and with the customary yards of railroad red-tape surrounding such events, Mr. Mitchell could readily understand what a delay this would mean. Moreover, to cap the climax, the Lake Shore road refused to handle the cars, declaring them not properly equipped for fast work. It was right here that the esprit de corps of the Zoological Park showed its true worth. Mr. Mitchell was a bulwark against all opposition, and his perfect familiarity with the proper railroad methods rendered him absolutely impervious to all opposition. Scarcely twenty minutes elapsed before the yardmen had expanded under the influence of Zoological Park spirit, and the cars were being whisked away to the repair yards. That was half the battle accomplished, but there yet remained the fact that we were denied the right to ride with the passenger service. Buffalo officials peremptorily refused. After a lengthy argument, Cleveland was reached by long-distance 'phone and the Traffic Manager reluctantly gave his consent to couple us with the second section of 37. Our spirits arose appreciably and after assuring ourselves that the construction work was progressing rapidly enough to ensure our making this train, we awaited our leaving time with great satisfaction.

At 1.30 we were attached to a train of express cars, running as the second section of 37. en route to Cleveland. We skirted the shores of Lake Erie, feeling the first real breath of winter sweeping across its surface. The season was three weeks earlier than the New York region, and autumn had laid her finger heavily on all the vegetation. Out of Dunkirk we ran into a smart storm of rain; a cold, penetrating one, which the rapid motion of the train drove into every nook and cranny, finally dripping into the remnants which the bull had left of our bed, so that we were forced to erect a shelter over it with a piece of oilcloth. The broken windows were repaired with New York dailies and overcoats donned. At every station the trainmen crept into the car, drenched, condemning the weather and accommodations with one breath. It was so delightful to see others miserable that our spirits rose in ratio. In spite of these dis-



EACH BISON WAS SPRAYED WITH CRUDE OIL.

comforts, this was our smoothest ride. We arrived at Cleveland promptly on the hour, the first, last and only time it happened. So far we had experienced some trials and tribulations, but the unvarying courtesy of the railroad people amply compensated us. We were not surprised to learn at Cleveland that the steam hose had once more been left along the line. This completely forestalled making the proper connections for St. Louis, and it was 3.50 Sunday morning before the Big Four could handle the cars.

The steam connections had to be repaired again at Indianapolis, and this, together with delayed trains, held us there until nearly ten o'clock Sunday night. The temperature still remained low, and when the train crossed Ead's Bridge into St. Louis, the structure glittered with frost.

At St. Louis we encountered the worst obstacles of the entire trip, with their resulting disappointments. Train service had grown visibly heavier, on entering the border lines of the West, and our scheduled time had long since been completely lost to sight and

memory, both by monotonous accidents to our equipment and lost time. At St. Louis the conditions were more congested than ever. Frisco Road had already informed the Terminal Association that it could not possibly accept the cars together. One car might go with No. 7 at 8.41 Monday evening, and the other at the same hour the next night. Better service than this was impossible. Mr. Mitchell then called on the Superintendent to the Wells-Fargo Company, and explained how desirable it would be to retain something of our

original arrangement. Together they went to the General Manager of the 'Frisco, but this was of no avail. As a last resort, the suggestion was broached of sending one car over the Rock Island to Oklahoma City, there connecting with the Santa Fe, but this the Santa Fe was unable to do, on account of heavy traffic. We, therefore, accepted the situation with the best grace possible, and divided the force in a manner suitable to the occasion.

The cars were thoroughly taken care of



A PORTION OF THE CORRALS, SHOWING THE SHELTER.



A PORTION OF WINTER VALLEY, SHOWING THE LOCATION OF THE CORRALS.

and the stock watered and fed. We found every one of the bison in as good condition as we expected. All the animals had become thoroughly accustomed to the unusual situation, and behaved exactly as if peacefully grazing in the Zoological Park.

Mr. Rush, in charge of car 6026, left St. Louis at 8.41 Monday evening and without delay or accident arrived safely in Cache Wednesday afternoon at 3.00 o'clock. Wagons were in waiting and the seven animals were safely transferred to the corrals at the Reserve before midnight of the same day. We remained until Tuesday evening at 8.41, at which hour we left St. Louis with the other car of eight animals.

No sleeping accommodations could be arranged in this car, and we transferred our blankets to the express car, where we slept on the floor the night through, arriving at Monette, Missouri, at 7 o'clock Wednesday morning. As nearly all of the western papers had described the bison transfer, our arrival at the various towns south of St. Louis was awaited with considerable interest, and in some

places it approached enthusiasm. As the sidedoors would be opened throngs of men, women and children rushed up to get a glimpse of the famous animals, and if the stop was long enough, they climbed in, and inspected the bison through the openings of the crates. In some places the car was packed to suffocation, and the people only departed when they were forced out by the speed of the train. The signs attracted attention everywhere and the curious observers noted them all along the line, reading as long as the car remained in sight.

The word "Zoological" was pronounced in more ways than I thought ever possible. The air became milder hourly, and it was possible to open the side doors, and view a country at once both interesting and strange. Gradually the hills gave way to low swells and the wooded portions were confined to the streams, whose course could be marked for miles by the narrow ribbons of green which finally lost themselves in the distant blue of the horizon. Fields of corn, some standing, others stacked, with an occasional field of



A BAND OF COMANCHE INDIANS WHO CAME FROM CACHE TO SEE THE BISON.

cotton, lay on every side basking in the mellow light of the early fall. We reached Oklahoma City at 11.30 Wednesday evening, where we remained until noon the next day.

The station at Oklahoma City was thronged with interested people who crowded the cars on both sides; and in fact these visits developed into ovations, the farther toward the promised land we progressed. At Lawton, we were surrounded by citizens who pined to see the bison, and as our hunger had by this time superseded all other considerations, we left the car in charge of a strong man who had kindly volunteered his services, so that we might satisfy the cravings of healthy appetites. After a ride of seventeen miles from Lawton, it was a relief to arrive at Cache at last, and know that our railroad trip was at an end, just seven days from the leaving time at New York.

Mr. Rush and Mr. Mattoon, the Acting Forest Supervisor, met us here upon the arrival of the train at 7.30 P. M. We commenced early in the morning to transfer the crates to the wagons provided, and by ten o'clock Fri-

day all were safely loaded. The entire population of Cache turned out, together with a band of Comanche Indians, resplendent in their gayest clothes. At eleven o'clock we started for the Reserve. One small bull persisted in thinking that liberty was the only thing he desired at that moment, and played a perfect tattoo against the ends of his crate, but aside from that, the caravan moved away without a hitch.

Mr. Rush had planned every detail with the greatest care, and the success of all the arrangements at Cache and the Reserve, was due to his tireless interest and forethought. We rode three miles over a flat, sandy road, bordered with prosperous farms, and through prairie land, studded with mesquite, and all along the streams with oaks, elms and various hard woods. The line of the Reserve is just within the borders of the Wichita Mountains. Once inside, the road was more uneven, and except for short distances became fairly rough, making the progress of the wagons rather slow. The direction was almost due north for a matter of six miles as far as Pattersöns.



A COMANCHE BRAVE.

He saw Bison in the valley in his younger days.

and from that point is extended toward the northwest. At Pattersons the trail winds through a forest of oaks; white, post, black jack and Texas red oak, which become scattered as Winter Valley is approached. Not a single evergreen of any kind can be seen in the low land, but a variety of cedar, scrubby and gnarled, grows on the mountain sides. The leaves of the oaks were a rich, glossy green, showing not the least sign that it was autumn. The country is certainly one of the fairest the sun ever shone upon. All one has read and all that imagination could conjure would be inadequate to picture this vision of loveliness, of nature scarcely touched by the hand of man, which spread before my astonished eyes when once we were fairly in the vallev.

The tan-colored sward swept away in a succession of gentle undulations, gradually merging into the blue silhouette of the mountains away in the west, and abruptly ending on the north and south, in the rock-covered sides of those nearby.

Through the center of the Bison Range, a clear stream traced its course with a hedge-like line of trees, the yellow tops of the tall cotton-woods marking its path as it disappeared among the swells. The silence was profound. It was a bit of nature as wild and free as though just created.

These mountains were a source of wonder to me as long as I remained, and when I knew better all their varying moods, Irving's beautiful description of the Catskills frequently occurred to my mind. "When the weather is fair and settled, they are clothed in blue and purple, and print their bold outlines on the clear evening sky; but sometimes, when the rest of the landscape is cloudless, they will gather a hood of gray vapors about their summit, which in the last rays of the setting sun will glow and light up like a crown of glory."



A COMANCHE SQUAW AND PAPOOSE.

One of band which camped at the corrals October 20th.



SECTION OF THE FENCE.

The eastern boundary of the Bison Range crosses the end of the valley and five miles beyond are the corrals, where the bison arrived about twelve o'clock. The wagons were driven in and the rear wheels dropped into depressions dug in the ground. After spraying the animals with crude oil, each was liberated. Aside from a very slight lameness, they were in perfect condition, greedily eating their allotment of hay. The corrals, three in number, each about 200 feet square, are placed just inside the southern boundary of the line fence, separated from it by a passage of 15 feet in width. Two long sheds with mangers have been erected on the northern side. Individual members of the herd may be quickly transferred from one corral to the next, through the lane on the south side, the ends of which can be closed with strong wire gates. The fence is 74 inches high, made by the Denton Wire Fence Company, of Denton, Texas, supported on oak posts twelve inches in diameter, set three feet in the ground. Above the fence proper, for greater security, are three wires extending parallel to the line of the top, about five inches apart. One of these will be insulated for a telephone service, which is being installed. The gates are most ingenious, handsomely constructed, and can resist the rush of a big

bull as easy as the fence itself. The grass in the corrals has been burned off, and the animal can get no other food but the alfalfa upon which they are now feeding almost exclusively. Large galvanized tanks. of the type used exclusively in the west, have been placed in each enclosure, and a constant supply of running water will flow into each as soon as the windmill on the banks of Cache Creek has been completed.

The bison will be kept in the corrals until spring, when Mr. Rush expects to liberate them into a range of some 200 acres. This pasture will be fenced in the winter and the grass burned. A number of cattle graze though the valley, and as it is quite well known that they carry the tick which causes Texas fever, the spraying with oil and burning of the grass have been thought expedient to prevent the bison from becoming infected. Mr. Rush is thoroughly familiar with all methods of prevention, and has adopted the most stringent measures to carry the animals through the dangerous season. Once they become acclimated, the danger line will be passed.

On October 23rd, with Mr. Rush, I rode along the line of the fence, which is being

constructed, but scarcely more than half completed. Its ponderous character has made the task a heavy one, especially through the gorges, where in places but one post can be carried at a time, and even then by hands alone.

We saw some signs of wolves and coyotes, but not a single furred animal nor game bird. Perching and rapacious birds were in abundance: jays, crows, flickers, meadow-larks, cardinals, eagles, buzzards, owls, hawks, sparrows, and several others



A GATE LOCK.



ONE OF THE GORGES IN THE MOUNTAINS.

The scrub growth in these gorges will provide splendid shelter in the winter for the Bison and Deer.

which were strange, flying in all directions. There are a number of quail in the range, and should increase, as food is abundant. The miners and woodsmen have all kinds of bear. wolf and panther experiences to relate, and if these animals were as abundant as they say, the calves would have very little show for their lives. The fence is nearly fifteen miles around, and encloses 6,200 acres of the best of the valley and the mountains on the western side. Four rangers will police the range at all hours, and the dangers from forest fires and breaks in the wires can be detected and reported with dispatch, as telephone boxes will be placed at each of the five range gates. Mr. Rush gives his entire time to the bison, and Mr. W. R. Mattoon, Acting Forest Supervisor, is in charge of the construction and working of the station.

It would be churlish and a neglect unpardonable not to award to Mr. Mitchell praise for the admirable manner in which the details of the transportation were executed. In every instance, his knowledge of railroad methods and his tireless energy overcame obstacles which would have meant hardship and perhaps death to some of the bison, and their safe arrival at Cache was due absolutely to his splendid work. The people of Oklahoma are enthusiastic over the Reserve, and are duly grateful to the New York Zoological Society for having thus established, in the finest portion of the great southern bison range, a herd which will soon increase to grand proportions, and play its part in the permanent preservation of the great American bison.

13971

Aquarium Number
Prepared by the Director of the Aquarium.

ZOOLOGICAL SOCIETY BULLETIN

No. 29

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AN INQUISITIVE SEA-LION.

SEVERAL years ago, when the writer was naturalist of the U. S. Fisheries steamship "Albatross," the vessel lay at anchor one evening in a little harbor in Puget Sound.

Two of the boats, a steam launch and a dinghy, which had been in use during the day, were moored to the lower booms swung out to accommodate them during the night.

Before dark a young sea-lion, swimming near the ship, was attracted by the barking of the writer's setter dog. It at once came and climbed into the dinghy, taking the greatest interest in the dog only a few feet above. Dropping into the water it swam about the ship, the excited dog racing fore and aft to keep it in view and barking loudly.

The sea-lion soon came back and climbed upon the stern of the steam launch on the starboard side.

After remaining in this position some time it returned to the dinghy on the port side. The sailors were warned not to disturb it, a camera was sent for and the accompanying photograph was taken.

During the evening the sea-lion changed its position from one boat to the other several times, and finally settled down on the broad stern seat of the dinghy, where it spent the night.

Sea-lions are frequently seen in Puget Sound and this animal probably belonged to one of the numerous sea-lion rookeries scattered along the adjacent coast outside of the Straits of Fuca.



AN INQUISITIVE SEA-LION.
From a photograph by C. H. Townsend

It was apparently not more than a year old and exhibited no fear of the ship's company, remaining in the boat until morning, when it was driven out as the boat was hoisted to the dayits.

NATURAL FOODS OF FRESH-WATER FISHES.

THE keeping of fishes and other forms of life in small aquaria is a wide-spread practice.

Probably a majority of the letters received at the Aquarium, from week to week, are of inquiry respecting the care of fishes, newts, frogs, turtles and the like. Leaflets of information on the care of goldfishes and other aquatic creatures have been prepared and printed for the purpose of facilitating correspondence of this sort.

The food of most of our game fishes consists chiefly of other fishes, which may at times be their own young. Fishes in general are feeders on animal life, and their food supply includes practically the whole aquatic fauna.

Fishes may be described as not only piscivorous and insectivorous, but as feeders on crustaceans, mollusks and worms. Plants do not constitute much of their food, although a few kinds feed freely on them, such as buffalo-fishes, carps and minnows. The young of many fishes nibble at tender plant shoots.

Some fishes are mud diggers, while others are downright scavengers. Rats, mice and kittens have (very appropriately) been found in the stomachs of catfishes, and mice have been found in black bass, according to Professor Forbes, who investigated the food habits of many species in the Mississippi Valley. A large pike would doubtless not hesitate to swallow a young muskrat, just as it does a young water-bird.

Newts and salamanders are eaten by fishes as well as frogs and tadpoles. The more predatory fishes may even kill the smaller water snakes, and it is probable that young alligators have enemies among some of the southern predatory fishes.

Among the chiefly fish-eating fishes may be mentioned pike, pickerel, muscallonge, pike-perch, burbot, gar, black bass, channel and mud-catfishes.

Those taking fish food in moderate amount

are represented by bream, blue-cheeked sunfish, mudfish, white-bass, rock-bass and crappie.

Fishes which are piscivorous to a trivial extent, are white perch, suckers, gizzard-shad, spoonbill, the various darters, top minnows and silversides, stickleback, mud-minnow, stone-cats and common minnows.

The fishes in general which are devoured in the largest numbers, are the smaller and more defenseless forms which occur in greatest abundance, while the young are naturally more readily eaten than the adults. The whole minnow tribe contributes to the food of the smaller fish eaters.

In the Mississippi region the gizzard-shad constitutes forty per cent. of the food of the wall-eyed pike, thirty per cent. that of the black bass, half that of the pike and a third that of the gars.

Mollusks, the snails, and mussels of various species, large and small—are also important as fish food. They form large proportions of the food of catfishes, suckers, fresh-water sheepshead and mudfish.

About sixteen per cent. of the food of perches, sunfishes, top-minnows and shiners is molluscan in character.

Fishes as a class feed largely on insects, and the minnows and darters chiefly so.

Insect food includes not only the aquatic forms in their various larval and mature stages, but also terrestrial insects cast into the water in many ways. The larval forms of neuropterous insects constitute about one-sixth of the food of fishes.

Crustaceans appear to be of even more importance as fish food, the minute Entomostraca being the principal kinds. The crayfishes are also eaten. Worms and leeches appear to be of comparatively little importance in the diet of fishes.

In the minnow family, vegetable forms—chiefly algae, make up about one-fourth of the food. The food of adult fishes naturally differs greatly from that of the young. The question then as to what constitutes the food of fishes may be answered: almost any living animal forms from the water, not too large to be swallowed, due consideration being given to the habits of the various species.

In addition to natural foods, both alive and dead, fishes in captivity will devour many kinds of meats and prepared foods.



A MOUNTED PORPOISE.

From a photograph by C. H. Townsend.

PORPOISES.

AFTER repeated failures, the efforts to get living porpoises for the Aquarium seem to give promise of success.

These bantams of the whale tribe have seldom been seen in captivity, and being little larger than adult sea-lions, would be ideal for exhibition in a collection of marine animals.

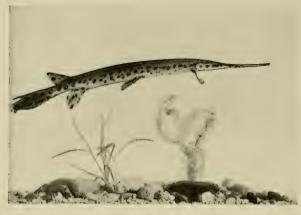
The manager of an aquarium has no animal market either at home or abroad from which to draw specimens. He must make special arrangements in each case, after incurring considerable expense, for the capture and transportation of the manatees, white whales or large fishes he desires.

Liberal but unavailing offers have been made to fishermen along the New Jersey coast, in the hope of inducing them to undertake the capture of porpoises which frequently enter the smaller bays and inlets. An especially favorable point has been located in North Carolina, and the Director of the Aquarium now proposes to assume the aggressive, and has ordered the construction of special netting for a porpoise hunt, to begin early in April.

The Aquarium procured an injured porpoise in August, 1905, which, however, lived only four days. Several kinds of porpoises are available: the common harbor species, (Phocana communis), five and one-half feet long, known to fishermen as herring hog, and puffing pig, and the common dolphin, (Delphinus delphis), seven and one-half feet long, being the best known on our coast.

These are, notwithstanding their classification, only diminutive whales in general appearance. They have the same wide oceanic habitat, and swim and blow in the same manner. There seems to be no reason why they should not live in captivity as well as the manatee, if given room to move about. They are warm-blooded air breathers, like the manatee, and come to the surface about as often to breathe. Being fish eaters they would be even easier to provide for. If our porpoise hunt is successful, and specimens can be kept in the large central pool at the Aquarium, we shall be able to learn something about porpoises not to be found in books.

The accompanying photograph of a roughly-mounted porpoise was made by C. H. Townsend, at Monterey, California, where it was captured.



THE BONY GAR.

1896, prior to the opening of the Aquarium in December of that year. The bony gars and mudfish have grown very slowly. The largest gar is about thirty inches in length. The Aquarium has five specimens of the short-nosed gar, (Lepisosteus platostomus), which were received from the Aquarium of the St. Louis Exposition in 1904.

Photographs from life of these species by Mr. L. B. Spencer, accompany this report.

LONG-LIVED FISHES.

ENTION has been made in previous Bulletins of certain large striped bass, (Roccus lineatus), which have lived in the Aquarium since May 14th, 1894. These fishes were placed in the large floor pool, which they still occupy, two and one-half years before the Aquarium was opened to the public. They are therefore nearly fourteen years old at this time, and have grown during that period, from an average length of six inches to about thirty inches, and now average about twenty pounds in weight. They have never been moved from the pool, and have lived continuously in brackish water

just as pumped from the harbor. Eighteen of the original fifty-four remain.

Being important game and food-fishes, they have received more attention from the public than certain other old-timers at the Aquarium which have lived here nearly as long. There are still in the building some specimens of bony gar, (Lepisosteus osseus), and mudfish, (Amia calva), which were received in

THE STURGEONS.

HE largest fishes which can be accommodated comfortably in the Aquarium are the sturgeons, an eight-foot specimen having occupied one of the floor pools over three years. Sharks of equal size have so far, failed to survive injuries received in capture.

Sturgeons are hardy species, readily adapting themselves to captivity, those at present in the Aquarium having lived there for over two years.

The sturgeons now in the central pool average about seven feet in length and were procured from pound or trap nets in the vicinity of Sandy Hook. These specimens are all



THE MUDFISH.



THE SHORT-NOSED GAR.

males and were delivered at the Aquarium by the fishermen for about \$25 apiece. Females of the same size would cost two or three times as much on account of the valuable roe they contain, which is salted and sold as "caviar"—a large specimen would contain from three to five good-sized pails of eggs. Sturgeon flesh is usually sold as "smoked sturgeon."

Our sturgeon fisheries on the Atlantic and Pacific coasts and in the Great Lakes have been declining for many years through overfishing, and fish-cultural science has as yet afforded little help in their restoration on account of difficulties met with in the process of artificial impregnation of the eggs.

Fifteen or twenty years ago the yield of the American sturgeon fishery exceeded ten

million pounds, while at the present time the quantity is little more than a million pounds. These figures do not include the "caviar" annually made from sturgeon eggs, which in some sections of the country equals the flesh of the sturgeon in value.

The two species frequenting Atlantic rivers are the large sturgeon, (Acipenser sturio), and the short-nosed sturgeon, (A. brevirostris), a small species sel-

dom used for food. The large sturgeon of the Great Lakes region and the upper Mississippi River, (A. rubicundus), is a species of great commercial importance, attaining a length of six feet. It inhabits also the interior lakes of Canada. All of these species are kept on exhibition at the Aquarium.

There are two species which enter the Pacific Coast rivers; the white sturgeon, (A. transmontanus), and the green sturgeon, (A. medirostris). The white sturgeon attains a

length of thirteen feet and a weight of 1000 pounds. It is common in the Frazer and Columbia Rivers, ascending the latter as far as the Snake River in Idaho.

The only other American species is the shovel-nosed sturgeon, (Scaphirhynchus platorhynchus), inhabiting the Mississippi River. It seldom exceeds four feet in length.

All the Atlantic and Pacific species are migratory, entering rivers and estuaries in the spring and summer to spawn. The two inland species never leave their fresh-water habitat. The large Atlantic sturgeon attains a length of ten feet and a weight of 500 pounds. It occurs from Maine to Florida, the center of abundance being the Delaware River, where the principal fisheries are locat-



THE LAKE STURGEON



FLASHLIGHT PHOTOGRAPH OF ROCK-BASS.

ed. It ascends the Delaware to the boundary of New York State. In Europe the same species sometimes attains a length of eighteen feet.

These large and important fishes are entirely inoffensive. Their mouths, devoid of teeth and situated on the under surface of the head and well back of the snout, are sucker-like in form, and can be protruded downwards like those of suckers. They are bottom feeders, eating small mollusks, worms, crustaceans, limited quantities of small fishes,

and more or less small plant life. The snout is used more or less for stirring up the bottom and there is usually considerable mud to be found in the stomach. Thesefishes might live in captivity for longer periods if it were practicable to keep them in mudbottomed pools.

The sturgeons, like the gars and dogfish, referred to elsewhere in this Bulletin, are fishes of ancient lineage, the species having been more numerous in former times, when many fishes, at least those known to us as fossil forms, were heavily armoured with bony

scales. All existing sturgeons are at once distinguishable by their five rows of heavy, bony scales. The sturgeon is quite an active species, often leaping clear out of the water. It was once the basis of a very important fishery in the Hudson River.

A TAME LOON.

A loon or great northern diver, was received at the Aquariumin September, 1907, where it was kept in one of the large salt-water pools which contained at the same time a collection of dogfish, (Squalus), skates and sculpins, for

about a month. Although the loon was supplied with an abundance of live killifishes, its activity led it to strike frequently at the large fishes, and it succeeded in swallowing one sculpin with a head larger than its own.

Even with a dry platform on which to rest, it never left the water of its own accord. In exploring the bottom of the pool, or in pursuit of killifishes, it swam underwater with the wings closely folded—never in use, and it spent much time swimming on the surface with the eyes submerged watching the large fishes below.



THE AQUARIUM BUILDING IN 1850.
From an old print.



THE AQUARIUM BUILDING IN 1830 From an old print.

THE ROCK-BASS.

THE rock-bass, (Ambloplites rupestris), shown in the accompanying flashlight photograph, is one of the most desirable species for large, home fish-ponds or small lakes. It must be very hardy, as specimens kept in the Aquarium are seldom affected by fish-fungus, and live well in captivity. It reaches a good size, sometimes weighing as much as two pounds, and readily takes all the common minnow, worm and insect baits as well as the artificial fly and trolling spoon. In ponds it makes a gravel nest like the black bass and guards it in the same way, but has not the highly predatory habits of the black bass respecting other fishes, and is also more prolific. Comparatively thick in body, the bass contains more meat than most fishes of its size. It is not difficult to obtain for stocking purposes, being distributed over most of the eastern and middle States. It is, on account of its red iris and strong markings, one of the most attractive of the fresh water fishes on exhibition in the Aquarium.

OLD PRINTS OF THE AQUARIUM BUILDING.

THE Zoological Society Bulletin for April, 1907, and the annual report for 1906 contained reproductions of some old prints of the Aquarium building which proved of interest to many persons.

The Aquarium library has recently secured two more rare prints which are reproduced in this issue of the Bulletin. One of these, engraved for the New York Mirror in 1830, shows the Aquarium building (Castle Garden), on the right, and Castle William on the left, across the channel, with some interesting costumes of the day in the foreground. The other, quite different from any of those heretofore published in the Bulletin, presents a view of the building in 1850, from the Bay. The older landmarks of the City have so nearly disappeared, that old-time prints of those which remain, possess historical interest.

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THE LARGEST MARINE ANIMALS.

The sulphur-bottom whale, which is definitely known to attain a length of eighty feet, is the largest animal that lives or ever has lived in the sea or on land, and there are other species of whales which frequently exceed sixty feet in length. It is not generally known that certain species of sharks attain lengths nearly equal to those reached by moderate-sized whales.

The largest of all fishes is the great whaleshark, (Rhinodon typicus), which is widely distributed in tropical seas, and has been found on the shores of Florida and the Gulf of California. It reaches a length of sixty

The next largest fish is the basking shark, (Cetorhinus maximus), of colder waters, which is credited with attaining a length of more than forty feet. Both of these sharks

are entirely inoffensive, living chiefly at the surface of the water, where they feed exclusively on small marine life.

The great blue shark, (Carcharodon carcharias), is however, a fish of entirely different habits, being an active species with a man-eating reputation. Specimens of enormous size have been taken, and it is believed by naturalists to grow as long as forty feet.

The oar fish, (Regalecus glesne), a fish of eel-like form but entirely inoffensive, is believed to attain a length of thirty feet. Quite recently a twenty-two-foot specimen, weighing between 500 and 600 pounds, was taken at Newport, California.

Among the rays we find fishes of enormous size, the largest of which is probably Manta birostris, which has a spread across the disc of as much as twenty feet, and a specimen weighing 1250 pounds has been taken. When Admiral Dewey was captain of the U. S. S. Narragansett, a specimen was captured by that vessel in the Gulf of California, which measured seventeen feet wide.

A fish probably exceeding in bulk even the largest of the rays, is the ocean sunfish, (Mola mola), which is credited with a weight of 1800 pounds. A specimen of this fish was taken not long ago at Redondo Beach, California, which weighed 1200 pounds. Other fishes of great size are, the sawfish, (Pristis), exceeding twenty feet, the tuna, (Thunnus), reaching fifteen feet and 1500 pounds, and the sleeper shark, (Somniosus), reaching twenty-five feet.

The great crocodile of the East Indies and Australia, (Crocodilus porosus), frequently found in salt water, has been measured at thirty-three feet and is undoubtedly the largest of all crocodilians.

The leather-back turtle, (Sphargis coriacea), is largest among the sea turtles. Professor Agassiz saw specimens "weighing over a ton."

One of the very long sea animals is the giant squid, (Architeuthis), three specimens of which have been taken on the coast of Newfoundland measuring fifty-five, fifty-two and forty-two feet, respectively; the last of these was exhibited for a time in the old New York Aquarium on Broadway.

The octopus, which lacks the extremely long tentacles of the squid, has been measured with a spread across the outstretched arms of twenty feet.

Largest among the seals, exceeding the walrus in length and perhaps also in weight, is the elephant seal of the Antarctic, specimens of which have been taken over twenty feet long.

SEA BIRDS AS HOMING "PIGEONS."

The past summer Prof. John B. Watson made observations on the homing instincts of gulls, terms and noddies during their nesting periods.

According to the report of Director A. G. Mayer, of the marine laboratory at the Dry Tortugas, Florida, where Prof. Watson studied the birds, "he demonstrated that if the sooty terns and noddies were taken to Cape Hatteras and liberated, they would return to their nests on Bird Key, Tortugas, a distance of 850 statute miles."

In the course of a winter's voyage on the U. S. S. "Albatross" in the South Seas, the writer found among the natives of the Low Archipelago many tame frigate-birds. The latter were observed on horizontal perches near the houses, and were supposed to be merely the pets of the children who fed them.

They were entirely tame, having been reared in captivity from the nest. As our acquaintance with the people developed, we discovered that the birds were used by them after the manner of homing "pigeons" to carry messages among the islands.

The numerous islands of the Low Archipelago extend for more than a thousand miles in a northwest and southeast direction, and it appears that the birds return promptly when liberated from quite distant islands. They are distributed by being put aboard small vessels trading among the islands. The birds are liberated whenever there is news to be carried, returning to their perches sometimes in an hour or less, from islands just below the horizon and out of sight of the home base. Generally they are in no great hurry. As the food of the frigatebird may be picked up almost anywhere at sea, there is no means of ascertaining how much time the bird loses in feeding or trying to feed en route. It may also linger to enjoy its liberty with other frigate-birds.

I did not observe tame frigate-birds elsewhere in Polynesia, but Mr. Louis Becke, who is familiar with most of the South Sea Islands, says they were used as letter carriers on the Samoan Islands when he was there in 1882, carrying messages between islands sixty to eighty miles apart. When he lived on Nanomaga, one of these islands, he exchanged two tame frigate-birds with a trader living on Nuitao, sixty miles distant, for a tame pair reared on that island.

The four birds at liberty, frequently passed from one island to the other on their own account, all going together on visits to each other's homes, where they were fed by the natives on their old perches. Mr. Becke's pair usually returned to him within twentyfour to thirty-six hours. He tested the speed of the "frigate" by sending one of his birds by vessel to Nuitao where it was liberated with a message at half-past four in the afternoon. Before six o'clock of the same day the bird was back on its own perch at Nanomaga, accompanied by two of the Nuitao birds, which not being at their perch on that island when it was liberated, it had evidently picked up en route. Sixty miles in an hour and a half is probably easy enough for the frigate-bird, as in Malayo-Polynesia it is said to have frequently returned a distance of sixty miles in one hour.

It becomes entirely tame and familiar when raised from the nest, and if given liberty returns regularly to its home-perch at night.

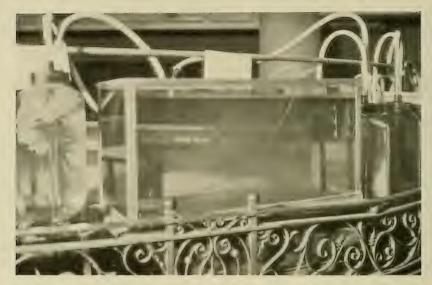
The largest rookery of frigate-birds I have seen, is at Tekokoto in the Low Archipelago.

Frigate-birds inhabit tropical and subtropical seas. The spread of wing is phenomenal for the size of the bird, being about eight feet, giving a wing power perhaps unequalled; although Walt Whitman has somewhat exaggerated its power of flight in the lines:

"Thou who has slept all night upon the storm, Waking renewed on thy prodigious pinions, Thou born to match the storm (thou art all

wings),
At dusk thou look'st on Senegal, at morn
America."

Judging from my South Sea experience, the "frigate" goes to roost at night like many other sea fowls.



A PORTION OF THE FISH HATCHERY, NEW YORK AQUARIUM.

Showing the hatching jars and receiving tank into which the young fishes flow after hatching.

A cloud of young fishes may be seen in the large tank.

THE FISH HATCHERY.

T is five years since the fish hatching exhibit was placed in operation at the Aquarium.

During this period it has afforded a practical illustration of the methods of modern fish-culture, and has shown the eggs and young of many kinds of food fishes in different stages of development, from the appearance of the dark eye-spots in the transparent egg, through the process of breaking of the shell and the absorption of the yolk sac, to the active swarming of the fry in the rearing troughs and glass tanks. The hatching of California salmon has proved especially interesting on account of the large size and brilliant coloration of the eggs, and the activity of the newly-hatched young with their conspicuous yolk sacs.

It has been operated without expense to the Aquarium, fish eggs being supplied from Government hatcheries, and the young fry removed to public waters by the State Fish Commission. The yearly output has averaged between two and three millions of fry and fingerlings.

During the past winter the Aquarium hatchery has been unusually interesting to visitors, the hatching jars and troughs having been filled to overflowing with eggs and young of brook-trout, rainbow-trout, Pacific salmon and Lake Eric whitefish.

A large information chart has been prepared and placed near the hatchery, showing the spawning seasons of fishes and the periods of incubation of the eggs of different species.

The accompanying photograph shows some of the automatic hatching jars, and their connections with one of the receiving tanks. The flow of water in the jars is so arranged that the young fishes rise to the surface after hatching and are automatically siphoned off into the adjacent receiving tanks. It is fascinating to most persons to observe the steady rising of young fishes when the eggs begin to hatch rapidly, and see them discharged through the glass and rubber tubes into the ever increasing swarms in the glass tanks.

They come so rapidly that the attendants have to remove them daily by the bucketful, to large reserve tanks, to prevent overcrowding. Shipments to State lakes have to be made frequently.

The picture shows a thick swarm of young whitefish in the middle of the tank, and a mass of yellow perch eggs floating at the top of the hatching jar at the left. The time required for the incubation of the eggs of most of our American trouts varies from forty days in the California rainbow-trout, to 125 days in the eastern brook-trout, at temperatures of 40° to 50°. Spawning may take place from September to May, according to the climate of the locality.

A notable exception is the spawning season of the black-spotted trout of the Rocky Mountain region, which occurs from May to July. This is the only fresh-water species whose eggs are available for keeping the hatchery in operation during the summer months.

The time required for hatching eggs of the Eastern salmons is from 157 to 169 days at 37° Fahr. Eggs of the quinnat salmon of the Pacific Coast hatch in about thirty-five days at 54° .

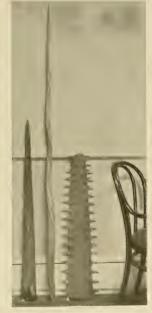
In most trouts and salmons the yolk sac is absorbed in thirty to forty days; in the blackspotted trouts the process is faster, being completed in about twenty days.

Whitefish eggs hatch in about 150 days at 34°; wall-eyed pike eggs in seventeen to twenty days at 43°; yellow perch eggs in seven to twenty-eight days and shad eggs in three to ten days at 55° to 65°. Whitefish spawn in November and December, wall-eyed pike in April, and yellow perch in March and April. Shad spawn from February to July, according to the latitude of the river they enter, which means February in Florida, and July in the New England States.

There were recently in the Aquarium quinnat salmon hatched from eggs shipped from California to New York by express. The eggs were stripped from the parent fish at a Government hatchery in California, and hatched for fifteen days or until the eye spots appeared in the eggs. They were then shipped in refrigerator boxes, which completely arrested the development until they reached the Aquarium, where about twenty-five days more in the hatchery troughs completed the incubation. Some of the large rainbow trout, now in the Aquarium tanks, were hatched in the building five years ago.

Enormous numbers of fishes can be safely and cheaply transferred from one part of the country to another, without water, as eggs, while the shipping of live fishes in tanks of water is both uncertain and expensive.

America leads the world in this modern science, and the Government plants thousands of millions of young fish in our waters every year. This important work is supplemented by the various State fish commissions throughout the country, which in the aggregate produce nearly as many more.



WEAPONS OF FISHES.

Sword of swordfish, tusk of narwhal and saw of sawfish.

THE WEAPONS OF FISHES.

THE accompanying photograph shows the sword of the swordfish, the saw of the sawfish and the tusk of the narwhal, three remarkable weapons of marine animals,

in the office of the Aquarium. The last, however, is merely the elongated canine tooth of a small whale, (Monodon monoceros), inhabiting Polar seas, and cannot be classed as a fish's weapon like the other two shown in the picture. In fact, it is not definitely known that the narwhal's tusk is a weapon at all. The tusk (sometimes there are two) is developed only in the male and has been known to grow to a length of nine feet four inches.

The sword, however, is a weapon, and one to be reckoned with, when attached to the head of an angry swordfish, (Xiphias gladius). The fish does not hesitate to charge the hull of a vessel. In the Academy of Sciences in Philadelphia there is a piece of four-inch planking through which a swordfish-sword has been driven with terrific force, the weapon remaining in the wood where it had broken off.

The swordfish attains a weight of 600 pounds, and the sword a length of nearly six feet. The real use of the sword to the fish is not in inflicting injuries on its enemies, but in obtaining its food. It is the habit of the monster fish to charge schools of mackerel and other fishes and disable many of them by violent thrashing of the sword from side to side.

The saw of the sawfish, (Pristis pectinatus), is used in precisely the same manner, fishes in schools being impaled or disabled by the sharp spines on each side of the saw. The saw sometimes exceeds six feet in length, and the whole fish has been found nearly twenty feet in length. Other fishes bearing swords, but of smaller size, are the spear-fish, (Tetrapterus imperator), and sailfish, (Istiophorus nigricans). In all these fishes the weapon is a flattened beak-like prolongation of the bones of the skull.

A number of fishes possess weapons which make them dangerous to handle. The lancets on each side of the tail of the surgeonfish (Teuthis), usually to be seen in the Aquarium, inflict serious cuts. They lie in shallow grooves and are erected instantly when the fish is angry or alarmed.

The sting of the stingray, (Dasyatis), is a serrated bony weapon situated on the tail, and very effective when thrust forward. It strikes with force and inflicts an ugly wound.

Very many fishes possess dangerous spines

which are defensive rather than offensive. Among these may be mentioned the spines of catfishes, sculpins, rockfishes and sticklebacks.

The remarkable "paddle" of the paddle-fish, (Polyodon spathula), of the Mississippi, although nearly one-third the length of the fish, is in no sense a weapon, being chiefly an organ of touch with which it stirs the mud in search of its food. The greatest recorded weight of the "paddlefish" is 163 pounds.

ELECTRICAL FISHES.

THE celebrated electric eel, (Electrophorus electricus), of South America—
the most powerful of electric fishes, is
not the only species capable of producing an
electric shock. Although not so large, the
electrical rays or torpedoes of our own Atlantic and Pacific coasts are able to discharge
quite forceable electrical shocks.

The electric ray resembles in size and general appearance the familiar sting-ray, but has a more rounded shout. It is found along the Atlantic coast from Massachusetts southward. Specimens taken at Woods Hole, Mass., have been offered to the Aquarium, but unfortunately have not lived long enough to be transferred. The Mediterranean species is sometimes exhibited at the Naples Aquarium. The writer has experimented with the electric ray in the Naples Aquarium sufficiently to appreciate the force of the shock it can give. The European species is said to attain a weight of 200 pounds. Electric rays or torpedoes, (Tetronarce), are found in nearly all warm seas.

The electric eel of the Amazon and Orinoco waters attains a length of over six feet. Its electrical organs are two masses of tissue extending along the tail, which, in this fish comprises the greater part of the animal. When its battery is put into action, it is said to be severe enough to knock down domestic animals in shallow water.

Since this fish is known to endure transportation, an effort will be made to procure specimens for the Aquarium. Specimens sent to London in 1842, lived several years in captivity, and attained weights of forty and fifty pounds.

The electric catfish, (Torpedo electricus), of the Nile and tropical Africa, is a fish at-



A GIANT LOBSTER.
Taken at Cranberry Isles, coast of Maine.

taining a length of about three feet. It is said that when kept in aquaria it is able to kill other fishes by its electric discharges.

Other fishes with more or less important electrical organs are, the Mormyries, very peculiar fishes of the fresh waters of Northern Africa, with extremely long, downward-curved jaws.

It is said that one may receive a shock from the electric organs of the ray, through a stream of water poured down upon it. The battery of electrical fishes may become completely exhausted by frequent discharges, but is renewed again after a period of rest. It is doubtless useful to them, both in the capture of their prey or in enabling them to escape from their enemies.

A LARGE LOBSTER.

N January 23rd, 1908, the Aquarium received a live male lobster, measuring thirty-four inches in extreme length, and weighing fourteen and one-half pounds.

It was at once placed in a tank of cold seawater, but it unfortunately died the next day, its death being attributed to the fact that it had been shipped with considerable ice packed in the sea-weed about it. It was taken at Cranberry Isles, Hancock County, Maine, and after death was mounted for the Aquarium.

It is many years since a lobster of large size has been seen at the Aquarium. Large lobsters are now very rare, although twentypound specimens were not uncommon twenty-five years ago.

Professor Herrick in his exhaustive work on the American Lobster, published in 1895 by the U.S. Bureau of Fisheries, considered very carefully the records pertaining to lobsters of large size, and examined many of the largest known specimens in museums and private collections.

Although lobsters are said to reach weights exceeding thirty pounds,

ceeding thirty pounds, Professor Herrick states that he "never obtained any reliable evidence that lobsters weighing over twenty-five pounds have ever been caught." Notwithstanding the records respecting the great weight of the European lobsters, Professor Herrick's investigations led him to the conclusion that it never equalled the American lobster in size.

His measurements of most of the large specimens preserved in this country led him to reject the records respecting the weight of many of them. What he considers "probably one of the largest lobsters ever taken on the Atlantic coast," came into his possession in August, 1893. It was captured in Penobscot Bay. Its living weight was found to be a little over twenty-three pounds." The length of this lobster was only twenty inches. (Measurement taken from the end of the spine or rostrum to the end of the tail.) The length of the New York Aquarium specimen, measured from rostrum to tail, was sixteen inches.

This was a male lobster, and all the records examined by Professor Herrick apply to lobsters of the male sex. He never heard of a female lobster which exceeded eighteen and one-half pounds.

In 1897 the Aquarium received a lobster, taken off Atlantic Highlands, New Jersey, which had a length of twenty-three and three-quarter inches from rostrum to tail, an extreme length of thirty-nine and three-quarter inches, and weight of thirty-four pounds.



THE CLIMBING PERCH.

This lobster is now in the American Museum of Natural History.

The largest specimen recorded by Prof. Herrick from the southern part of the lobster's habitat, was a male said to weigh twenty to twenty-two pounds, captured on the Delaware coast.

In view of the commercial warfare now being waged against the lobster, it is unlikely that any specimens of such sizes will be taken in the future.

FISHES THAT FLY AND CLIMB.

THE Aquarium has usually one or more specimens of the climbing perch, (Anabas scandens), of the East Indies, which has the habit of leaving the water and moving freely on land, even climbing the trunks of trees to the height of five to seven feet. Its habits are well known in the East. and as it is quite hardy in captivity, it is shipped to many parts of the world as an aquarium fish. It can usually be obtained from dealers in aquarium supplies at small cost. When placed on the floor, as has been done at the Aquarium, it progresses readily, keeping an upright position without turning over on its side as other fishes do. The lower part of the gill-cover is rough-edged and can be turned forward. By turning slightly to one side or the other, the spines on the gill

covers can be made to touch the floor and pull the body along. The tips of the pectorals are pressed downwards to assist in keeping the body upright. When kept in aquaria, the fish will sometimes crawl out of the water if supplied with the proper means for doing so.

It possesses a moisture secreting cavity under the upper part of the gill-cover in which air is retained for breathing. The accompanying photograph by Mr. Spencer is that of a climbing perch nearly five inches long.

This is not the only species of fish which voluntarily takes to the land. There are several species of mud-skippers which seek their food on land and readily scramble over rocks or climb onto the roots of trees.

They are very numerous on the shores of some parts of Asia and Polynesia, and belong for the most part to the genera *Periophthalmus* and *Boleophthalmus*. A very active fish of this character in the lizard-skipper, (*Alticus saliens*), of the Samoan Islands, which darts over the rocks with ease and rapidity.

The well-known flying-fishes have pectoral fins large enough to sustain them on flights greater than an eighth of a mile. I have, in fact, observed the large flying-fishes of the South Seas to go as far as a quarter of a mile. When rising constantly in large numbers under the bows, we could by going aloft, determine the distance of the flight to be at times more than six ship lengths; the Albatross being 250 feet long. By putting insulated electric lights into the water at night, when anchored off the islands, we caught flying-fishes for food with long-handled dip-nets, many of the fishes being from twelve to sixteen inches in length.

Mr. Edwin C. Kent has just killed in Florida a giant ray (Manta birostris) measuring fourteen feet in extreme width.



THE DIAMOND-BACKED TERRAPIN.
Albino specimen from Texas.

MISCELLANEOUS NOTES.

Manatee. Attention is again called to the fact that the manatee presented on September 5th, 1906, by Mr. A. W. Dimock, of Marco, Florida, is still living comfortably in its pool at the Aquarium. It has therefore, as this Bulletin goes to press, lived nearly nineteen months in captivity and has broken the captivity record for a manatee by one month. It has never missed a meal since its arrival and has subsisted contentedly on lettuce leaf trimmings in winter when salt water eel grass was unobtainable.

Improvements. Among the improvements effected at the Aquarium during the year 1907, were additional gas and electric lighting for the tanks and pools, a feedwater heater to secure economy in coal consumption, and a bronze heater for sea water.

Harbor Scal. At the close of the Exposition at Jamestown, Virginia, the U. S. Fisheries Bureau presented to the Aquarium a harbor seal which had been on exhibition at the Exposition during the summer.

Sca-Lions. The two sealions added to the Aquarium collection last fall proved to be uncommonly desirable specimens. They have done little of the noisy barking that most sea-lions indulge in, and their active frolics in the water are usually continued all day long, to the great interest of visitors.

Attendance. The number of visitors at the Aquarium in 1907 amounted to over two millions—an average of 5,800 a day. The January and February attendance of the present year has been nearly one-third larger than ever before.

Albino Terrapin. Messrs. Chesebro Brothers, of Fulton Market, presented to the Aquarium, on December 30th, an albino diamond-backed terrapin, which is of unusual interest, owing to the rarity of albinism among turtles. The top shell measures seven and one-quarter inches. It is a perfect albino in shell, head, feet and skin, lacking, however, the pink eyes usual among such specimens. The carapace and plastron have a creamy tint, somewhat less white than that of the head and legs. The customary small



FLASHLIGHT PHOTOGRAPH OF BROWN TROUT. Several of these are albinos.



THE SEA-LION POOL, NEW YORK AQUARIUM.

spots of the skin show faintly. It came from the salt marshes of Texas, and is probably the species known as Malaclemmys littoralis.

Bulletin. A thousand copies of the Aquarium number of the Bulletin were sold at the

Aquarium during the past year.

Tuna. Mr. M. G. Foster, of New York, a member of the Zoological Society, has presented to the Aquarium a mounted specimen of the tuna, taken by himself at Santa Catalina Islands, California. The weight of the fish when killed was 152 pounds and the time required for its capture with rod and reel was forty-three minutes.

Albino Trout. Among the brown trout fry hatched during the year, were 133 perfect albinos, with pink eyes; nearly all of these survived and have grown quite as rapidly as those of normal coloration and are now six inches long. Four of the pink-eyed albino lake trout fry received at the Aquarium in March, 1905, are still living and average twelve inches in length.

LUMINOUS FISHES.

PISHES possessing phosphorescent organs are fairly common in the surface waters of the sea, but the vast majority of such fishes are found in the depths of the ocean, and this is true not only of the fishes, but the invertebrates as well.

Below a couple of hundred fathoms, light does not penetrate, and wherever deep sea forms are found, the gloom of the depths is doubtless brightened considerably by animal phosphorescence.

Modern deep sea explorations have shown that perhaps a majority of the deep sea fishes possess luminous organs of more or less power, which are disposed in a variety of ways.

Deep sea blind fishes have been discovered in which the phosphorescent organs are very large. Such organs are usually visible in fresh specimens as whitish spots on various parts of the head and body, and are probably useful to the animals possessing them in seeking their prey.

ZOOLOGICAL SOCIETY BULLETIN

No. 30

Published by the New York Zoological Society.

July, 1908

THE MOUNTAIN GOAT BREEDING IN CAPTIVITY

N May 20, 1908, the first Rocky Mountain Goat ever bred in captivity, was born in the New York Zoological Park. Its parents were brought from British Columbia by Director Hornaday in November, 1905, with three other specimens. All five were born in May, 1905, and were captured in the mountains north of Fort Steele.

Since the arrival of the little herd in New York, all of its members have been maintained in excellent health. They are fed upon very clean crushed oats (in the hull), sliced carrots and potatoes, an occasional apple and all the clover hay they can eat. There are three adult males and two females, and they have been

given three large corrals and a rustic barn in the southwestern corner of the Park. For amusement and exercise they climb all over the roof of the barn, and spend much time aloft.

Although very level-headed and calm in times of real danger, the Mountain Goat is shy of being handled and petted, and with nervous impatience flings itself away from an outstretched hand. But one member of the herd will permit its keeper to touch it. Although they are not quarrelsome toward each other, they were so free in prodding each other with their skewerlike horns it was necessary to saw an inch from each horn-tip.

Quite a number of goats have come into cap-



ROCKY MOUNTAIN GOAT AND KID BORN IN THE ZOOLOGICAL PARK.



ROCKY MOUNTAIN GOAT KID.
Three days after birth.

tivity, but very few have survived longer than a few months. The climatic conditions of the Atlantic coast region have carried off eight other goats of our acquaintance in two years or less, and until now it has been doubted whether it were possible to acclimatize the species on the Atlantic coast, and maintain it in health and vigor up to the breeding point. For this reason, the news of the birth in the New York herd will be hailed with delight by all sportsmen and nature-lovers.

The period of gestation was from November 25, 1907, to May 20, 1908, or four days less than six months. The kid now in the public eye was born at 3 A. M. At 3.10 it arose to its feet; by 3.30 it was jumping about the stall, and climbing upon its mother's back, as she lay upon the straw. It nursed for the first time at 3.20. Two days after birth it was thirteen and a half inches high at the shoulders, and weighed seven and a quarter pounds. Of course its pelage is pure white, and, like nearly all young hoofed animals, its eyes now are practically black. It is very strong and capable, and seems to take a very hopeful view of life. It is a male, and has been christened "Philip," for reasons that every goat-hunter will understand.

While nursing, it stands directly under its mother's body, and makes a continuous whining noise, like a young puppy. Frequently it butts the udder, and then the mother patiently raises a hind leg, to give her offspring the best possible opportunity. The mother is a model of what wild-animal mothers should be, a good milker, affectionate, solicitous for her offspring, and quiet and sensible toward her keeper.

The Zoological Park goat herd is in charge of Keeper Bernard McEnroe, who has managed it with great skill and success. He never permits any of the goats to get thoroughly rain-soaked, but shuts up the herd whenever it begins to rain. In New York it was quickly learned that Oreamnos can not endure rain. The pelage absorbs water like a sponge. holds it for hours, and the animals have not sufficient vitality to endure it.

THE NEW YORK ZOOLOGICAL PARK.

ITS PRESENT STATUS, AND HOW IT APPEARS TO FOREIGN CRITICS.

A T this date the New York Zoological Park may be regarded as seven-eighths complete. But for the unfortunate financial conditions which have prevailed during the past six months, and which seem destined to influence both the public mind and the public purse during the next half year, the end of 1909 would have witnessed the rounding-up of the Zoological Society's work in the Bronx.

On August 11, 1908, ten years will have elapsed since the beginning of work in the improvement of the Park. It will be remembered that the Park was formally opened to the public on November 8, 1899. But for the temporary halt in the erection of the final buildings, the Park would have been rendered practically complete in eleven years from the beginning of active work. At present there remain to be erected the Elephant House yards and the Administration Building-funds for which have already been formally appropriated, and at last are expendable, and also the Zebra House, and the Eagle and Vulture Aviary-as yet unprovided for. The end of all this is so near, that it seems reasonable to hope the very small amount of additional funds required to secure



BOSTON ROAD ENTRANCE TO THE ZOOLOGICAL PARK.

Recently completed at West Farms.

the completion of the Park can be made available within a short time.

In the total number of mammals, birds, reptiles and amphibians on exhibition, the Zoological Park stands to-day at the head of all the zoological parks and gardens of the world. The Twelfth Annual Report of the Zoological Park contains the following table showing our rank according to the total number of living specimens on exhibition.

All are as of January 1, 1907, except New York and London, which are for 1908.

Institution.	Mammals	Birds,	Reptiles and Amphibians	Total.
New York Zoological Park	607	2530	897	403
Berlin	946	2176	27	3149
London	873	1621	478	297:
Philadelphia	487	952	1087	2526
Hamburg	173	1665	251	2389
Schoenbrunn	593	1351	171	2083
Cologne	424	1479	98	2001
Breslau	592	1067	184	1843
Frankfort	644	1002	158	180

The character of the New York Zoological Park as a whole, its grounds, its buildings and its collections, are in the main quite well known to the people of New York City and vicinity. To-day the buildings of the first class that are complete, occupied by animal collections and open to the public, are ten in number, not count-

ing the magnificent new Elephant House, which will be completed in the autumn or early winter. Of second class animal buildings there are ten more, and of large groups of outdoor dens, aviaries and corrals, there are twelve. There are also eight entrances, six public comfort buildings, two restaurants and three animal storehouses for winter use. The area of the Park in land and water embraces 264 acres. Of walks and roads there are about eight miles, and of fences ten and one-half miles. The maintenance force of the Park, constantly on duty, embraces 141 persons. The number of visitors in 1907 was 1,273,046,-nearly onethird of the entire population of the metropolis of the American continent. Of this number it is estimated that a quarter of a million visitors were from outside of New York City.

To all members of the New York Zoological Society, and to all residents of New York, the opinions of foreign critics on the Zoological Park are of much interest. Entirely aside from the value of local opinion, it is worth while to see ourselves as others see us. On this point we may quote the opinion of three German professors who came to America last August as delegates to the Seventh International Zoological Congress. At the close of their visit in New York, they addressed to one of the leading newspapers of this city the following letter:



GROUP OF YOUNG GIRLS FROM A LOWER EAST-SIDE SCHOOL.

Thousands of school pupils, conducted by their teachers, annually visit the Zoological Park.

New York, Sept. 1st., 1907.

To the Editor of the

New York Staats-Zeitung:

"As a supplement to your article headed 'In the Lion House,' which appeared in No. 208 of the New York Staats-Zeitung, we take the liberty to send you, in a few words, the views of the German zoologists on your zoological garden. The article mentioned is incomplete, for the reason that it does not do justice to the many superior features.

"Among all existing zoological parks, there is none in which the animals are found in such absolutely natural conditions as here in New York. The extent of the ranges for deer, bisons, etc., and the imposing flying cage, had the undivided admiration of all the scientists present. Added to this is the great number of interesting forms of animals, especially of the American fauna, and last but not least, is the surprisingly large number of individuals.

"The past attainments give a guarantee that the New York Zoological Garden, upon completion, is sure to take a specially pre-eminent position among institutions of its kind."

(Signed) Professors Braun, Heymons and Bogert.

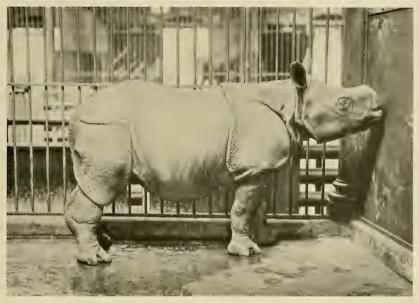
The latest critical opinion on the New York Zoological Park is that of Dr. Walther Schoenichen, of Berlin, which appears in an article on this institution published in the last number of "Aus der Natur," with illustrations. Two of its paragraphs are as follows:

"There are few places in the world where all desirable conditions have been fulfilled in so excellent a manner, as in the Zoological Garden in New York. Although it has existed only the short space of time since 1899, already it belongs with the most prominent institutions of its kind, and when all of those installations which are now in the course of preparation have been finished, it will surely be the grandest and most beautiful garden in the world.

"The farsightedness and devotion with which the Zoological Society has fulfilled this duty, is not the last thing which must fill the visitor to this grand animal park with admiration and inspiration." W. T. H.

INTERESTING ANIMAL SURGERY.

N May 28, 1908, an interesting and unusual operation—that is unusual in the animal world—was performed on our Indian Rhinoceros, "Mogul," by Dr. George G. Van Mater, of Brooklyn, for cataracts in both eyes. The operation, in medical parlance, is termed "needling," and is primarily a rupturing of the crystalline lens, allowing the humor to escape



INDIAN RHINOCEROS, "MOGUL."

into the anterior or aqueous humor, where a process of slow absorption takes place. A cataract is not, as most people suppose, a growth over the ball of the eye, but a gradual change of the humor in the crystalline lens, to a milky opacity, eventually destroying the sight. "Mogul" was captured in 1906, and upon his arrival at the Park, it was noticed that the right eve had been injured. Gradually the defect communicated itself to the left eye, in time rendering the animal nearly blind. Dr. Van Mater diagnosed the case as cataract and advised the "needling" operation which is only practicable in soft or young growth cataract. "Mogul" was cast, by means of combination side lines and hobbles, with considerable difficulty, requiring the united aid of Drs. Blair, Ryder and Ellis, and a number of the keepers, to effectually subdue him. Dr. Gwathmey administered the anesthetic, using a mixture of chloroform and ether. Fully an hour elapsed before the animal succumbed, exhausting in its struggles one and one-half pounds of chloroform and three-quarters of a pound of ether. As is quite well known, the eve is the surgeon's index of the patient's condition under anesthetics, and as

this was the point of operation, it was then necessary to resort to local anesthesia, rendering Dr. Gwathmey's task a difficult one. Dr. Van Mater then punctured both capsules with a delicate knife of peculiar and ingenious construction. The incision in the cornea was a thin slit, but after penetrating the front of the crystalline lens, the blade was turned in the handle, as it was drawn back, making a T shaped cut, which allowed the humor to flow into the anterior chamber. The blade then being turned back on its axis necessarily passed through the cornea in exactly the same place as it entered, effectually preventing the thin humor of the anterior chamber from escaping. The operation was blood-less and painless. The animal, despite the enormous amount of anesthetic taken, was standing upon his feet within forty minutes after the operation. He is recovering the use of the left eve. The right one, being an advanced growth. is vet cloudy.

The work consumed nearly three hours, and the services of the operating surgeons, Drs. Van Mater and Gwathmey and their assistants, Drs. Ryder and Ellis, were gratuitous.

E. R. S.



JAPANESE RED-FACED MONKEY AND YOUNG

NOTES.

Zoological Park.

Japanese Red-faced Monkey.—One of the very interesting young animals this year is a Japanese red-faced monkey, born at the Small-Mammal House on June 4. The parent is one of several which has lived out of doors the year round. The tenderness, if her savage vigilance can be construed into that, is remarkable. No movement of the little animal escapes her. If he wanders a few steps from her side, she follows at once, and at the slightest demonstration from a spectator, clutches him close to her breast, ready to retreat. The young animal clings tightly underneath to the long hair of the mother, and is carried rapidly and easily. The little fellow is covered with black hair and bears very trifling resemblance to the parent.

Nesting-Birds.—The fearlessness with which the birds nest in most accessible places is becoming more marked each year, and is a gratifying evidence of their sense of the protection afforded them. In the bay trees on Baird Court, a song-sparrow and a purple grackle are rearing young broods, and not far distant one of the small lindens shelters a robin. On the walk back of the Elephant House a wood thrush has a nest in a small horn-beam, with a young brood. A pair of humming birds have elected to choose the store yards back of the shops as a summer home, and in defiance of the turmoil

are cheerfully raising a family. Vireos and robins live in harmony in a small oak at the conservatory entrance, and in the cornice brackets of the Service Building and the facade of the Mammal House, in conspicuous places, two robin broods have already been reared. The nest at the Service Building is now occupied by some English sparrows. Two young vireos, just leaving the nest, were observed near the Polar Bear Den, and farther along Beaver Valley a wood thrush was running about under the shrubbery followed by her young offspring. A swallow has fastened her nest to the wall of the sleeping den of the Polar Bear and at this time has not been disturbed. A wood-duck made her nest high up in an oak tree in the Beaver Pond. but was disturbed by squirrels, and gave it up. The Canada geese have raised several goslings and the mallard ducklings on the wild-fowl pond are a legion.

The Wichita Bison Herd.—The last news from the Wichita National Bison Range reported the herd in first-class condition, and the outlook for the future entirely satisfactory. The two calves born on the range are doing well. An effort is being made to procure a few elk to introduce in the range, and it is reasonably certain that this plan will be carried into effect at an early date.

Heads and Horns .- The number of gifts to the National Collection of Heads and Horns that have been received during the past year entirely surpasses the most sanguine expectations of the founders of the Collection. Both in number, and in zoological value, the array is most gratifying. The future of the Collection is now quite beyond the pale of doubt. A number of sportsmen of international reputation have sent some of their finest and most highly prized trophies; and in Alaskan heads and horns the Reed-McMillin Collection is fairly beyond compare. Part II. of the annual Heads and Horns publication, now in press and soon to be mailed to all members of the Zoological Society, contains notices of all the gifts received during the past year.

Births.—During 1908 the births among the manmals of the Park have been unusually numerous and important. A partial enumeration reveals the following species: Rocky Mountain goat, Beatrix antelope, mouflon, Spanish ibex, South American tapir, Burmese thameng, barasinga deer, sambar, axis, fallow, sika, mule and white-tailed deer, elk, Bactrian camel and American bison.

Aquarium.

White Perch as Destroyers of Mosquito Larvæ.—During the last week of May some of the employees of the Aquarium were sent to the lake in Prospect Park, Brooklyn, to collect specimens of black bass and white perch for exhibition at the Aquarium. The large seine which was used brought in hundreds of young perch, a few of which were injured by being "gilled" in the meshes of the net. Mr. W. I. DeNyse, who was in charge of the collecting party, observed the young perch to be distended with food which on examination was found to consist chiefly of the larvæ of mosquitoes.

This observation is important in view of the increasing interest taken in fishes useful in combating the mosquito nuisance. The white perch is a fish of the coastal waters, ascending streams to spawn. Although chiefly a marine species, it can be kept permanently in fresh water, where, however, it does not attain so large a size. As it is an excellent food fish, the fact that the young are active feeders on mosquito larve will be of special interest to persons selecting fishes for private ponds.

Attendance.—The winter attendance at the Aquarium has been larger than ever before; the number of visitors from January 1 to April 30 inclusive having been 666,525, an average of over 5,500 a day. Heretofore the attendance for the first quarter of the year has but once exceeded half a million and has seldom exceeded 450,000. This winter's record serves to indicate that the year's attendance will far exceed the two-million mark passed two years ago.

Increasing Use of Carp.—The carp problem in this country is being gradually solved by the commercial fishermen who are sending this fish to market in greater quantities each year. The statistics of the U. S. Fisheries Bureau place the annual catch of carp at about twenty million pounds.

The greater part of the catch of carp is made in the Mississippi River and its tributaries, where the annual yield exceeds twelve million pounds, half of this total being derived from the Illinois River.

Over four million pounds of carp are taken from the Great Lakes, three and a half millions coming from Lake Erie alone. In other parts of the country the carp is not yet being taken in very large quantities for market purposes, although the Middle Atlantic States contribute over a million pounds.

The greatest development of the carp fishery is taking place in Ohio and Michigan, the fish being taken from Lake Erie and Lake Michigan. The fishermen of Illinois have been making money out of the carp for several years and have been supplying a large part of the seven or eight million pounds used each year in New York City. There are now several other good markets for carp, which the fishermen are supplying at a fair profit. In many places along the Ohio shore of Lake Erie the fishermen are enlarging the ponds they have for some years been using for retaining carp taken from the Lake. The carp are caught in immense quantities, which makes it profitable to handle them at a low price and are shipped whenever the conditions of the fish market are favorable.

Large Sea Turtle.—On June 3, the Aquarium received a large Leather-back turtle, (Dermochelys coriacea) from Bayhead, New Jersey, where it was captured. The specimen weighed 750 pounds and measured six feet and five inches from beak to tail. The top shell, along the median ridge, was five feet long. Unfortunately it did not reach the Aquarium alive, although apparently without external injuries of any kind.

The Leather-back is the largest of all the marine turtles. Unlike most of the other species it does not live long in captivity.

The New Salt Water System.—The New York Aquarium is now using its new salt-water system known as the closed circulation. Pure sea water, brought in tanks from the ocean, and stored in a reservoir, is pumped to the distributing tanks on the upper floor, whence it flows through the exhibition tanks and then through gravity filters back to the reservoir.

The new reservoir—holding 100,000 gallons of stored sea water—and the new filters, have been quietly under test for three weeks, and

have given entire satisfaction.

This is the most important change that has yet been made by the Zoological Society in methods of operation at the Aquarium. It means that the exhibition tanks containing marine species will hereafter be supplied with real sea water instead of the brackish, sewage-laden water of the Harbor. It means also that the high death rate among the sea fishes and invertebrates due to polluted water, will be done away with, and that the exhibition of many forms of marine life new to our collections will be made possible. During the month of July the marine exhibition tanks will be re-stocked.

C. H. T.

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THE PASSING OF THE WHALE.

The attention of all persons interested in the conservation of the animal resources of the world, is especially directed to the article by Mr. Lucas on "The Passing of the Whale," published as a supplement to the present number of the Bulletin of the New York Zoological Society. It is a truthful statement by one of the best-informed students of the subject. The valuable whale is unquestionably going fast—faster than the valuable fur seal—and soon may be classed with the sea otter, American bison and other wealth-producing animals whose commercial value has been lost to man. As a source of wealth the whale is the most important of all.

Steps have been taken by the Zoological Society to place the information contained in this article before legislative bodies in many parts of the world.

The Society as a scientific association devoted to the preservation of wild animals, earnestly requests the careful consideration of it by every legislator into whose hands it may come.

C. H. T.

BISON SOCIETY SUCCESSFUL.

The Montana National Bison Range is now, to all intents and purposes, an accomplished fact. Congress has promptly and cheerfully entered into the plan of the American Bison Society for joint action by the government and the Society in the creation, on the Flathead Indian Reservation, of a great national herd of pure-blood American bison, perpetually endowed with a range of 20 square miles of good grazing grounds.

The quick success of the campaign in Congress has been almost phenomenal. Five years ago, it would have been impossible for any man or body of men to have succeeded in inducing Congress to appropriate as large a sum as \$40,000 for the preservation of any species of wild animal other than the fur seal. But the sentiment in favor of wisely conserving the resources of nature has lately aroused many men who previously had not paused to consider that subject.

Owing to the absolute necessity of paying the Flathead Indiaus for the lands desired, an appropriation of \$30,000 has been made, and for fencing the range a fund of \$10,000 has been provided. It is a reasonable certainty that the range chosen by the Bison Society and formally proposed to Congress, will be selected; and it will be known hereafter as the Montana National Bison Range.

In order to provide means for the purchase of the herd of about forty pure-blood bison which it has agreed to present to the government, the Bison Society is now setting out to raise, by a great popular subscription which is to cover the whole United States, a fund of \$10,000. Every state and territory will be invited to contribute toward the creation of the Montana national bison herd. This campaign is in charge of Dr. W. T. Hornaday, with headquarters at the New York Zoological Park, who invites every American citizen to subscribe, any sum from \$1 upward, and do it now.

THE SPECIAL ANIMAL FUND.

Because of the absorption of more than \$17,000 from our Animal Fund in payments for rhinoceroses, elephants, and other thick-hided

but expensive animals, the general collection of smaller mammals was well-nigh totally ignored for nearly eighteen months! At last certain gaps caused by the death of short-lived species became so apparent as to be unendurable. In-asmuch as the members of the Board of Managers were called upon for \$10,000 for the current expenditures of the Society, it was deemed impossible to repeat the call upon them, even for animals.

The case being particularly desperate, the Director of the Park received authority to raise a much-needed animal fund as a special subscription. In view of the fund raised by the annual members a short time ago, it seemed necessary to limit the call to the life members of the Society, and a very few others. The case was stated without any reservation, and an effort was made to secure \$4,000.

In view of present financial conditions, and the extra-heavy demands that are being made upon all men and women who give money to worthy objects, the responses up to date have been extremely gratifying. The following subscriptions have been received up to June 20:

Charles H. Senff	\$1,000
Robert S. Brewster	500
Andrew Carnegie	
Edward S. Harkness	500
G. S. Bowdoin	200
Henry Phipps	100
James B. Ford	100
Zenas Crane	50
George D. Pratt	50
H. C. von Post	50
George B. Hopkins	50
Oliver G. Jennings	50
J. P. Morgan, Jr.	50
David Lydig	50
W. R. Coe	50
William Church Osborn	
Samuel P. Avery	25
Mrs. Farquhar Ferguson	25
Lloyd Phoenix	25
John J. Pierrepont	25
Mrs. William Gilman Nichols	25
Dr. L. Haupt	10
R. P. Lounsbery	10
Samuel Riker, Jr.	10
	₹3.505

Never in the history of the Society have subscriptions been more welcome than these. Up to this date the following animals have been purchased, to fill up gaps in the collections:

Balance urgently needed.....

3 Alpine Ibex, breeding adults.

- 1 Polar Bear.
- 1 Hamadryas Baboon.
- 2 South African Ostriches.
- 2 Dingoes.
- 1 Binturong.
- 2 Prong-Horned Antelopes.
- 1 South American Wild Dog.
- 1 Black Ape.
- 2 Wanderoo Monkeys.
- 4 Marmosets.
- I Black-Footed Ferret.
- 6 Black and Fox Squirrels.
- 1 Mexican Red Squirrel.
- 3 Beavers.
- 2 Otters.
- 1 Stone Marten.
- 4 European Red Foxes.
- 5 Hedgehogs.
- 3 Roe Deer.
- 1 European Squirrel.
- 3 Canada Porcupines.
- 1 Humboldt Woolly Monkey. 6 Covpu Rats.

W. T. H.

LAWRENCE WARBLER IN CAPTIVITY.

One of the most interesting results of this spring's collecting in the Bird Department, is the acquisition of a male Lawrence Warbler in full plumage, (Helminthophila lanrencei Herrick). It will be remembered, that in 1904 the Curator reported the fact that a Lawrence Warbler mated with a female Blue-winged Warbler, had a nest and six unfledged young in the Zoological Park.* These nestlings subsequently flew in safety and the nest is now in the collection of the Zoological Society.

On May 13 of the present year the Lawrence Warbler now living in the collection was trapped in the Park almost on the very spot where the nest was located four years ago. This is merely circumstantial evidence but it rather favors the theory that the bird is either the male parent bird or one of the young of the former brood. Each spring since 1904 careful search has been made in this vicinity but nothing has been seen of Lawrence Warblers, although Blue-Winged Warblers breed there regularly. The warbler collection bids fair to be ahead of that of any former year, there being now about twenty living species on exhibition. If the Lawrence and a Blue-wing can ever be persuaded to nest in captivity the long-contested question of the status of the former, whether a hybrid, a valid species or one in the process of formation, will be settled once for all. C. W. B.

See Zoological Society Bulletin No. 14, page 165, and No. 15, page 181.



EAST AFRICAN LIONS "SAMBOUT" AND "SERGOIT," Presented by Mrs. Armar D. Saunderson.

TWO LIONS FROM AFRICA.

THE most valuable and desirable of all lions, young or old, are those to which can be applied the magic word "imported." This term signifies a jungle-bred animal, with a wilderness constitution, and all the stamina that wild paternity can impart.

The Society has recently received from Mrs. Armar D. Saunderson two fine male lion cubs that belong in the "imported" class. They were captured by Mr. and Mrs. Saunderson on February 20, 1908, in the southwestern corner of British East Africa, when about two weeks old. The mother lioness had four cubs in all, two of which she managed to carry off to a safe retreat before the hunting party arrived.

The two cubs captured were taken to Mr. Saunderson's camp, and hidden in a pile of saddles and boxes. For several nights the mother prowled about the camp, roaring at intervals, but finally she abandoned her efforts to recover her offspring.

Both the cubs are males, and have been named "Sambout" and "Sergoit," after two large rocks

that rise out of the Guas N'Guishu plateau. For several days following their capture they were fed on warm milk, to which was presently added a midday meal of raw meat that had been put through a mixing machine. They were carried in two chop boxes, on porters heads, for over 100 miles to the Uganda Railway, and came to New York by way of Mombasa, Marseilles and England.

"Sambout" and "Sergoit" will be quartered in one of the large eastern cages of the Small-Mammal House until they are old enough to go to the Lion House. They are very docile and affectionate animals, and are taken out by their keepers for a daily walk, in collar and chain.

Dancing Cranes.—A stranger might imagine the cranes were crazy or affected by the heat if he came upon them during play time, and apparently that is what it can be termed. The Sandhills dance around in a circle, jumping about in the most grotesque way with outstretched wings and necks, continuing for

lengthy periods, usually terminating the performance by a wild flight down the range. But the Asiatic white crane has two tricks which he performs with idiotic abandon and punctilious care. He selects some spot in the range, and bores a hole into the turf with his mandibles; standing over it he pumps his head up and

down, until one wonders how long he can keep it going. If you go away and return in one hour, as I did, you will find him still at it. Again he seizes a feather in his beak and tosses it into the air, and as it falls leaps for it and catches it, repeating the trick, as the keeper told me, for over an hour at a time.

CENSUS OF AMERICAN BISON, JANUARY 1, 1908, OF PURE BLOOD.

	Males	FEMALES	CALVES IN 1007	JAN. 1, 1908	TOTAL IN 1 03
Captive in the United States	506 214	610 262	203 98	1116 476	969 41
Total in America	720 54	872 76	301 22	1592	1010 109
Total in Captivity	774	948	323	1722	1119
Wild Bison in the United States, Estimated				25 300 2047 45 19	

BUFFALO-DOMESTIC HYBRIDS, "CATTALOES"

	1907 1908
In the United States	 260 243
In Canada	 57 17
In Europe	 28 21
Total on January 1, 1908	 345 281

DOCILE WILD ANIMALS.

By R. L. DITMARS.

In every collection of animals there is always a number of individuals that particularly interest the keepers. The men usually designate such examples as "pets," although not all of them are to be altogether trusted as are most members of that ever-interesting class. In fact, a few mammals sometimes gain a species of favoritism through a display of extreme ugliness.

There are now living in the Zoological Park a considerable number of animals which the keepers term "pets." The Small-Mammal House contains the most interesting assortment of them. It was at this building, but a few days past, that Mr. Sanborn endeavored to photograph a "rounding up" of the keepers' favorites, but owing to the attempted association of members of such widely different orders

as the Carnivora, Rodentia and Edentata, the proposed group prepared for a battle royal. In deference to a strong prospect of a lively scrimage, the attempt at making a photograph was abandoned.

In the Small-Mammal House the most amusing pets are a South American wild dog, two dingoes, a badger, several civets, an agouti, a Malabar squirrel and an armadillo. When the keepers of that building are cleaning their cages in the early morning, most of the animals mentioned have the free run of the building, although the men are necessarily careful not to thus exercise those of their pets that might injure each other. The badger and the agouti are absolutely to be trusted not to stray away, and are permitted to run at will outside the Small-Mammal House. It is not unusual for an excited visitor to report at the Small-Mammal House that he has met a strange-looking animal ambling along the path, that had



BACTRIAN CAMEL AND YOUNG.
The young animal was born in the Zoological Park April 6, 1908. At the time of birth it was so helpless that it was necessary to lift it to the mother in order that it might nurse.

stopped and chattered in an alarming manner. This is always the badger, which noisy little creature often comes as far as the Reptile House, always prompted by an untiring appetite.

Here, alas for romantic writers, it must be explained that much of the docility among animals is prompted by appetite and selfish interest. This accounts for some of the friendly advances of deer and other hoofed animals, many of which will treacherously attack one in the corral. With most of the "tame" flesh-eating animals, the sight of food effects a startling change in temper. The amusing little badger is a veritable demon when given his food, and continues to growl over the bone for hours afterward. Not all, however, among our keepers' special favorites are thus influenced by appetite.

Quite an exception to the former rule is a fully grown golden agouti, living in the Small-Mammal House. The agouti belongs to a group of rodents known as the Cavies. Nearly all of them are uniformly good natured, even to that gigantic creature, the capybara, which is as big as a large pig, and has teeth strong enough to instantly amputate a man's finger.

The agouti in question often runs free about the Small-Mammal House like a miniature deer. It obeys the call of keepers Kane and Landsberg, and permits the men to lift it back to its cage. In an adjoining cage is a large Malabar squirrel, which, when turned loose, seems to actually tease the men as they try to get it back, but when a step-ladder is brought the creature evidently reasons that the game is at a close; for it immediately darts for its cage door.

The most important and interesting of the Park's tame animals are the fine lion cubs Sambout and Sergoit, presented by Mr. and Mrs. Armar D. Saunderson. At present, the keepers are taking these animals for a daily walk over the lawns, each one controlled only by a collar and chain. But the friendly spirit of these lions soon will change. When about eleven months old, the cubs of nearly all the big cats become vicious and unmanageable, unless subjected to constant handling and training, the latter usually involving quite vigorous treatment, and much nerve on the trainer's part. Even today, these small lions will suffer no human interference at feeding time.



SOUTH AMERICAN TAPIR AND YOUNG.

The young tapir was born April 22, 1908. Both the old and young are extraordinarily docile and very fond of any attention from the keepers.

In the Primate House are creatures that so closely parallel humanity, both in action and structure, that it seems inappropriate to speak of them as "wild animals." Young orang-utans and chimpanzees are like children. They insist upon throwing their arms about the keepers' necks, to be carried about, and when the men finally insist upon putting them down, they scream lustily, or bump their heads against the cage floor in infantile rage. Almost anyone can handle these young anthropoid apes, but in the Monkey House there are many other animals of very different temper.

From the visitor's point of view, one of the most vicious monkeys in the building is a big Japanese red-faced monkey. This creature often shakes his cage front, gripping it with both hands, and using all his strength. Such exhibitions are followed by what the brute evidently intends to be an illustration of what he would do if he had the chance. It consists of placing his hand in his mouth, and biting at it quite savagely. Strange to say, this demoniacal creature is perfectly gentle with his keepers. By assisting him to walk upright, he can be led about like a child. He is under such perfect control that the men never have taken a stick or whip into the cage. A mild cuff with the hand, delivered by keeper Reilly or Engeholm, causes the sour-visaged brute to whimper and cringe, but the instant the men close the door and leave the cage, Jake hurls himself at the bars as if to avenge an imaginary insult from a visitor.

As examples of actual affection among mammals, we might select a woolly monkey and a spider monkey, both on exhibition in the Primate House. At the rattle of the lock these animals spring for the cage door. The keeper barely has a chance to open the door when a pair of long arms are wound about his neck and the man finds himself in much the same predicament as Sinbad. It is only with the help of an associate that the burden can be dislodged. Ordinarily, Keeper Reilly carries the strange woolly monkey about with him, slung over his back, rather than provoke the chorus of earsplitting shrieks that would follow if the monkey were at once forced back into its cage.

A considerable degree of docility is to be observed among the inmates of the Reptile House. There is a big Cuban iguana quartered in the north corral of the Lizard and Tortoise Yards. which is so fond of Keeper Toomey that whenever the latter enters the corral the reptile rushes to him, crawls up his back and to his shoulders, where he perches contentedly. Nor is this creature's interest in his keeper prompted by appetite; for he behaves the same immediately after feeding time, when all of the iguanas are so gorged they refuse further food. The big tortoises are also docile, following their keeper about their corral, but in them there is so marked a decrease of interest after feeding



YOUNG MEXICAN PUMA.

One of a pair of pumas which were sent to the Park, arriving in a very emaclated condition. It is thriving on milk fed from a bottle.

time that little or no affection may be attributed to their movements.

First-Keeper Snyder has a number of charges which he classifies as pets. Most of the alligators take their food from his hand, and there are a number of snakes that invariably come to the door of the cage when open and crawl about the keeper. With all of the serpents, appetite is usually the cause of their interest in the keeper, though the desire of an occasional specimen to get out of its cage will cause many visitors to remark upon the snake's great joy at beholding the keeper at the open door.

The king cobra is possibly the "favorite" in the Reptile House; but here favoritism comes from an extreme display of craftiness and ferocity! This dangerous serpent has been on exhibition about nine years, and is just as vicious as the day he was received. He is always ready to strike his keeper, and would never miss the opportunity if the chance was presented. A display like this, of a really dramatic rage, is always appreciated by the keeper. It is the listless animal, lacking both signs of docility or real hostility, that is looked upon with disfavor.

A WHITE RHEA.

THE Rhea is the most graceful of all the ostrich-like birds and the most interesting to us as being the only representative of these birds in our hemisphere. It inhabits the level,

prairie-like pampas of South America and its enemies are chiefly the jaguar and the puma. From these it is protected by its tall stature, giving it a wide outlook, its dull gray plumage and its keen eyesight. Unfortunately these qualities are of no avail against the attacks of men, and unless means of protection are found the Rhea will soon become extinct.

White birds are occasionally seen and the Zoological Park has recently acquired one which in beauty excels all the other inmates of the ostrich house. In a wild state, a bird of this color would have short shrift, and as it walks about its range we can readily perceive how easy it would be for the enemies of the bird to detect it at a distance; its white, fluffy plumage standing out in sharp silhouette against the green grass. The eyes are not pink as in ordinary albinos but pale blue.

Although the two Rheas already in the collection are a true pair and from time to time lay beautiful golden eggs, yet they willingly accepted the newcomer and showed no display of the fierceness which characterizes most other birds of this group.

A pair of One-wattled Cassowarys which arrived with the Rhea, fought so fiercely that they had to be separated, and even then continued their altereation through the fence so that it was necessary to remove them from each other's sight.

C. W. B.

A SCIENTIFIC EXPEDITION TO THE DELTA OF THE ORINOCO.

N the 22nd of February, 1908, Mrs. Beebe and the writer sailed on the Royal Mail S. S. "Trent" for Trinidad, off the northeast coast of South America. Our chief object in taking the trip was to study and photograph something of the wild life of South America and to obtain alive some of the interesting birds of that continent for the collection of the Society. In both we were decidedly successful.

On the way south we touched at Kingston, Colon, Savanilla and La Guira, spending from one to three days at each port. Desolation is the impression one carries away from Kingston; the vulture-haunted ruins of the earthquake of a year ago, remaining almost untouched. We found that Sunday at Colon is a day of absolute cessation of all work, but we were fortunate in securing a special train which took us across the Isthmus. Cleanliness, and the evidence of rapid and thorough progress compelled our attention everywhere. It was play day, and along the route pony racing and baseball alternated with ranks of vine-covered engines (relics



WHITE SOUTH AMERICAN RHEA IN THE ZOOLOGICAL PARK.

of the French occupation), hundreds of neat, mosquito-screened houses and vistas of the gigantic ditch.

Savanilla presented the antithesis; a collection of tumbled-down, dirty, thatched huts scattered about in a desert. But there were compensations—of a kind. If one purchased a train ticket for 20 cents and paid with a five-dollar American note, one's change would be a large roll of yellow bills, aggregating \$480—in Colombian money. A Colombian dollar at this time exactly equalled an American cent! It was surprising to see ragged soldiers sitting in the streets, gambling away bills of large denominations.

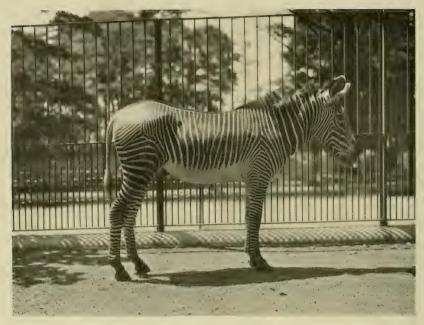
At La Guira one gives no thought to the town itself, which is a typical Latin scaport, but is lost in admiration of the wonderful mountains which tower upward for thousands of feet almost sheer from the water. It is the grandest part of the whole Spanish Main.

Port-of-Spain, the capital of Trinidad, we found a most wide-awake and American-like city and the citizens hospitable and kind. We were delayed there a week or two, but at last were able to charter a twenty-one ton sloop and

with a captain, cook, and crew of three, we sailed westward under the Venezuelan flag, headed for the northern part of the Orinoco delta.

From now on we were in the midst of primitive nature and our results group themselves naturally under two heads: first, the aboreal and aquatic life of the vast expanse of mangrove swamps, and second, our studies of the peculiar fauna and flora of La Brea, the pitch lake of Venezuela, which represents the very beginning of the high land adjoining the mangroves. Of the pitch lake we had heard a good deal politically, and from a natural history point of view we found it intensely interesting. Thes results will be worked up as quickly as possible and published by the Society.

Some two hundred excellent negatives were secured of flowers, insects, fish, birds and Indians. A collection of forty living birds and two arboreal porcupines were brought back, all arriving safely and in good health in New York. All the species of birds are new to the collection. Besides these, several lundred specimens of bird skins, embryos, eggs, fish and insects were collected.



GREVY ZEBRA, EQUUS GREVYI.

Most interesting among the living birds are the sun bittern, scarlet ibis, white-faced treeduck and kiss-ka-dee tyrant flycatchers, besides several species of beautiful tanagers.

Perhaps the most important result of the expedition is the arrangement which was made with several gentlement to send shipments of live birds and animals in the future to the Zoological Park, at the mere cost of capture and shipment. Men on board regular steamers plying between Trinidad and New York were instructed in the care of birds and the interest of the captains aroused. It is hoped that the wonderful bird life of South America may, before long, be represented by a splendid series in our Zoological Park.

C. W. B.

A RARE ZEBRA.

THE Zoological Park has very recently acquired a fine male specimen of a most uncommon equine species known as the Grevy Zebra, (Equus grevyi), so named in honor of an ex-President of France. It is not

only one of the rarest zebra species, but it is also one of the largest and most showy. It is strongly characterized by its large size, its complete suit of very narrow black and white stripes, of generally uniform width, and its large ears. Its stripes extend quite down to its hoofs.

This very handsome animal is found in southern Abyssinia and northern Somaliland. Thus far, practically all the specimens that have reached Europe and America have come from Abyssinia, and several of them have been sent out by King Menelik. The total number in captivity, outside of Africa, is probably about fifteen. The value of Equus grevyi has been high, usually \$2,000 per head, or even more, but there is likelihood that this figure will sensibly diminish.

For the present, our specimen will be found in the Antelope House. We now exhibit five species of equines, as follows: Grevy zebra, Grant zebra, Chapman zebra, Persian wild ass and Prejevalsky horse.

W. T. H.

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THE PASSING OF THE WHALE.

By FREDERIC A. LUCAS.

Curator in Chief of the Museum of Arts and Sciences of the Brooklyn Institute.

THE attention of all persons interested in the conservation of the animal resources of the world, is especially directed to the article by Mr. Lucas on "The Passing of the Whale," published as a supplement to the present number of the Bulletin of the New York Zoological Society. It is a truthful statement by one of the best-informed students of the subject. The valuable whale is unquestionably going fast—faster than the valuable fur seal—and soon may be classed with the sea otter, American bison and other wealth-producing animals whose commercial value has been lost to man. As a source of wealth the whale is the most important of all.

Steps have been taken by the Zoological Society to place the information contained in this article before legislative bodies in many parts of the world.

The Society as a scientific association devoted to the preservation of wild animals, earnestly requests the careful consideration of it by every legislator into whose hands it may come.

 $C.\ H.\ T$

The New York Zoological Society at its Annual Meeting in January adopted a resolution relative to the protection of whales by international agreement.

The idea that the preservation of whales was necessary and desirable was new to many members of the Society. This was perhaps natural as whales and whaling industries do not come under the observation of the average citizen. Yet whales as economic animals have been and continue to be of immense value to man. They are of the greatest possible interest zoologically,

since they are the largest of existing animals. One species—the Sulphur-bottom whale—attains a length of eighty feet, being of greater size than the extinct dinosaurs, the largest of the wonderful animals of the past.

From a strictly American viewpoint the whale deserves serious consideration as it was half a century ago the basis of an industry which brought great wealth to the New England States. In the days when the whale fishery was most important there were over six hundred American ships and many thousands of men regularly engaged in that industry.

During a period of nearly fifty years prior to about 1872 the value of whale oil and whale-bone landed by American vessels, amounted to more than 270 millions of dollars.

Subsequently the whaling industry as conducted from vessels gradually declined. The present method of whaling from shore stations is of quite recent introduction.

It is a startling fact that nearly all species of whales are threatened with early extinction by reason of the destructiveness of modern methods of whaling, practiced chiefly from stations located on shore.

The protection of whales is therefore necessary if any whales are to be left for future supply. How rapidly whales of all kinds, save possibly the Sperm whale, are disappearing before the attacks of man, may be inferred from a glance of the shore-whaling industry and particularly at that of Newfoundland, whose statistics are most readily available and where the effects of modern methods are most apparent.

Before 1903 we have no data as to the number of whales taken along the coast of Newfoundland and can only say that the value of whale products rose successively from \$1,581 in 1898, to \$36,428 in 1900, and \$125,287 in 1902. Making a rough estimate, based on the value of the products of the whale fishery, one may say that this represents not less than 350 whales, more probably about 500, since prior to 1902 the waste was very great. The first whaling station in which modern methods were adopted was established in 1897 and its success was so great that in 1903 four others had been erected and three more planned, although but three steamers were then employed. R. T. Mc-Grath in the Report of the Newfoundland Department of Fisheries for 1903, gave it as his opinion that no more applications for factories should be granted for some years to come, saving "Two factories are about to be erected, one at Trinity and one at Bonavista-during the coming year. This will make eight factories in all, viz., Balena, Aquaforte, Snook's Arm, Chaleur Bay, Cape Broyle, Bonavista and Trinity. In my opinion no further applications should be granted for some years. If licenses are given without restriction, it will result in complete depletion of this industry within a short time; whilst if judiciously dealt with, it will be a profitable source of revenue, and a great assistance to the laboring people of the colony for many years to come." This advice, however, was not heeded, the only restriction placed on whaling being that stations should not be nearer one another than twenty miles and that but one steamer should be employed. These restrictions were practically of no avail as one steamer was all that could then be employed to advantage and a run of twenty miles is nothing to a 12-knot vessel. So whaling stations rapidly multiplied until by 1905 eighteen were in operation, occupying all the more favorable locations about Newfoundland, Labrador and the Gulf of St. Lawrence, and fifteen steamers were employed. The effects of this over-multiplication were felt at once, and while in 1903 three steamers took 858 whales, or an average of 286 each, in 1905 fifteen steamers

took but 892 whales or an average of only 59 a vessel.

	1903	3	vessels	tool	k	858	whales
6.6	1904	10	4.6	4.4		1275	6.6
	1905	15	6.6			892	44
	1906	14	6.6	6.6		429	44
6.6	1907	14	6.6	4.6		481	44
T.	l l.	- 4	100	00.11	2001	3935	whales
	nated	etw	een 189	18-15	902, esti-	350	6.6
						4285	whales

Thus in ten years more than 4,000 whales have been captured in the immediate vicinity of Newfoundland. The effect was disastrous and caused the ruin of the smaller companies, the chief sufferers being the smaller shareholders who had invested their entire capital.

One of the arguments in favor of indiscriminate whaling has been the theory that whales had the whole world to draw upon and that the depletion in any one locality would soon be supplied by overflow from another. To a slight extent this may be true for there seems some reason to believe that whales do now and then pass from the Pacific to the Atlantic* but on the whole whales are restricted in their range as other animals† and extermination in one place means extermination in that locality for all time. Another fallacy was the belief that the supply of whales was practically limitless and that one might "slay and slay and slay" continuously. There is not a more mischievous term than "inexhaustible supply," and certainly none more untrue. So we see our inexhaustible forests on the verge of disappearing, our inexhaustible supplies of coal and oil daily growing less, and the end of the inexhaustible supply of whales in sight. Man is recklessly spending the capital Nature has been centuries in ac-

^{*}Capt. Bull states that a Sulphur-bottom whale shot on the coast of Norway contained a harpoon fired into it on the coast of Kamehatka and that a Humpback killed off Aquaforte was found to have in the flesh an unexploded bomb lance fired from a San Francisco whaler in the Pacific.

[†]For example, the Sulphur-bottom is not found or occurs as a straggler on the East coast of Newfoundland; although once common on the South coast.

cumulating and the time will come when his drafts will no longer be honored. It matters not whether the vessel is a bucket or an ocean, one can only take out as much water as it contains and where all is outgo and no income, it is merely a question of time when one or the other will be emptied.

The history of the Newfoundland whale fishery merely repeats what has taken place everywhere the whale has been hunted, the only difference being that owing to the limited area covered and the use of modern appliances results have been reached more quickly than in the days of sailing vessels and hand harpoons.

It is a matter of record how the Right whale was successively swept from the Atlantic coasts of Europe and North America, then from the North Pacific and finally from the Southern Seas, and what has happened in the case of this species will happen in the case of others. The great Bowhead, owing to its restriction to a portion of the Arctic seas, and the ease with which it may be taken, is in a worse plight than his smaller relative and it is quite possible that the present generation will see its actual extermination.§ And yet this monster once flourished in such numbers that for nearly three centuries its capture gave employment to hundreds of vessels and thousands of men. How abundant this species actually was we can only surmise from the former size of the whaling fleet and the statistics of its catch, though the oldtime wood cuts showing the chase of the whale seem not to exaggerate its abundance. The American whaling fleet at the time of its greatest activity numbered from 500 to more than 600 sail, while in England, our most active competitor, from 25 to 60 vessels cleared from the port of Hull alone and several other towns contributed to swell the Arctic fleet which comprised from 150 to 250 vessels.

The imports of whalebone into the United States from 1805 to 1905 were 81,985,655 pounds. Averaging 2,000 pounds per whale, a rather high estimate, this would represent no less than 40,804 Right and Bowhead whales taken by American whalers.

Taking the port of Hull, England, we know partly by the actual returns and partly by estimates based on the yield of oil, that the ships of this port between 1722 and 1820, took in Davis Strait and on the East Coast of Greenland, no less than 10,207 whales and a fair estimate of the total English catch would be about 20,000 Right and Bowhead whales, so that in two centuries not less than 50,000 were killed by English and American whalers alone.

But this is only a portion of the catch taken in the north, for as early as 1660 the Dutch sent 500 ships to the Spitzbergen fishery alone, and by the end of the century the number had risen to 2,000. Even though many of these were so small that now-a-days they would be looked upon as mere boats, the total catch prior to 1750 must have mounted into the thousands. §

The contrast of these figures and the returns for the past two years show to what a low ebb the whales of this part of the world have been reduced, for in 1906 the catch of the Dundee fleet was but seven, and in 1907 only three whales were taken, one of these even being a yearling.

The catch of the San Francisco fleet was 20 in 1906, and 82 in 1907, but the success of the past year is the direct outcome of failure the year before, and the number of Bowheads taken this year will undoubtedly be small.

Nothing can possibly prevent the extermination of the Bowhead but the discovery of some perfect substitute for whalebone, and there seems not the slightest probability that this will be done, so that this huge creature will be one of the many victims immolated on the altar of fashion. Meanwhile it is worth noting that there is not a specimen of this whale in the United States and very few in the world and

The writer is quite aware that this species still survives and, owing to the cessation of whaling for some years, has even increased in some localities. This increase is now being taken and in a year or two the species will again be at a low ebb.

[§]The possible extermination of the Right and Bowhead whales was foreseen as early as 1850, and conments made on the large number of whales lost by sinking and on the evil results of killing the Right whale on its breeding grounds.

[¶]According to Wieland the number of Bowheads taken by the Dutch between 1669 and 1758 was 57,590.

that some of the money being spent in futile endeavors to reach the North Pole might much better be devoted to chartering a whaler and securing one or two examples of the Bowhead before it is too late.

The Right whale was the first to be commer cially exterminated, that is so reduced in numbers that its pursuit was no longer profitable, because it frequented the shores of temperate regions and there brought forth its young. It required but few years to wipe out the California Gray Whale as it was confined to a comparatively small area and the decimation of the others is but a matter of time.

The great Bowhead as we have just seen, is on the verge of actual, not merely commercial, extermination and is liable to be blotted out of existence at any time and other species will follow unless something is done to preserve them.

For many years certain species of whales, notably the Sulphur-bottom, enjoyed more or less immunity from pursuit, due to the difficulty of taking them by methods then in vogue and the small profit yielded when they were taken. But when the present appliances for taking whales were perfected the death knell of these whales was sounded and unless some measures are taken to protect them, they, too, will suffer the fate of the Bowhead.

Whaling stations are being established the world over wherever the conditions are favorable; there are several on the Pacific coast, several on the coast of Patagonia, and while in

deference to the fishermen, restrictions have been placed on the Norwegian whale fisheries, other stations have been opened in Iceland and the Færoes. There is some whaling from New Zealand and South Africa, and concessions have been granted for other parts of the world. This does not include whaling for Sperm whales and Humpback carried on from various Atlantic and South American ports. Moreover the rapid decline of the Newfoundland whale fishery has led some of the companies to send their steamers south in winter, accompanied by a large steamer fitted out for cutting in whales and trying out the oil, thus acting as a floating whaling station that may be moved from place to place as occasion requires or favorable conditions offer.

We speak of the *decline* of the whaling industry when it is really the *passing* of the whale, for there can be no industry in the proper sense of the word when there is no planting, only reaping, no attempt to provide for the harvest to be gathered.

Whales can be protected and protected very easily but it can only be done by international agreement. When we are far enough advanced, many industries like whaling and sealing, now on the verge of extermination, may be pursued for all time. This may be very difficult to bring about, but may be accomplished in time. The pity of it is, from a purely practical standpoint, that animals which can so readily be preserved, should be swept out of existence.

13,971

ZOOLOGICAL

SOCIETY BULLETIN



NORTH FACADE AND DOME OF THE ELEPHANT HOUSE.



F the building operations in the Zoological Park, the most important single feature is the "new" Elephant House.* Of ten years of building work, it is the climax; and it is fittingly crowned with a dome. It is situated on the site prepared for it by Nature, and chosen twelve years ago, on the axis of Baird Court, and in the open space midway between the Court and the Wolf Dens. In effect, it connects the two great groups of installations of the northern and southern regions of the Park, which until now have been slight-

ly separated.

In several important particulars the Elephant House is unlike all other buildings in the Park. It is high; it is entered at the center of each side, instead of at each end; it is built entirely of stone; it has a main roof of green tiles, and has a lofty dome covered with glazed tiles laid in an elaborate color pattern of browns and greens. The dome is finally surmounted by a "lantern" of elaborate tile work, also in colors. Excepting the dome, the whole exterior structure is of smoothly dressed Indiana limestone. Each

* We have been calling it "new," because previous to its completion, the thousands of visitors who inquired for "the Elephant House" were directed to the Antelope House, where the elephants were temporarily quartered.

entrance consists of a lofty and dignified archway, in which the doors are deeply recessed; and each of these arches is grandly ornamented by animal heads, sculptured in stone. The lines of the exterior of the building are imposing.

The color effects of the interior are particularly pleasing. The large, flat bricks of the Gustavino arch system are in their natural colors, and form a blending of soft brown and buff shades that not only avoids monotony, but is pleasing and restful to the eye. Com-

bined with the vaulted ceilings of the main halls and the cages there are a few strong arches of mottled buff brick which harmonize perfectly with the ceiling tiles of the main dome. This scheme of vaulted ceilings is so new that few persons ever have seen a finished example. Both the main dome. and the arched ceiling below it, have been constructed by Gustavino without the employment of either the steel rafters or ribs which one naturally expects to see in such structures.

The animal sculptures on the Elephant House are of commanding interest and importance, and well worthy of the stately building that they adorn. In the sculptor's competition which was held last year, the work of Messrs. A. P. Proctor and



HEAD OF INDIAN ELEPHANT, SOUTH FACADE. The Sculptor, A. Phimister Proctor, at Work.



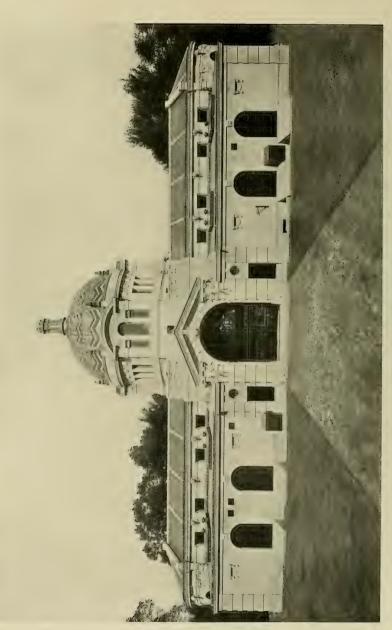
INDIAN ELEPHANT "GUNDA" IN HIS NEW QUARTERS AT THE ELEPHANT HOUSE.

Charles R. Knight was so nearly equal in merit that it was impossible to choose between them, and for this reason the work was divided. one-half of it being awarded to each. Mr. Proctor has executed for the south entrance, two large heads of the Indian elephant and an Indian rhinoceros, while Mr. Knight has modeled the three heads of African elephant and African rhinoceros that ornament the north entrance. All these are fine examples of wild-animal sculpture, and well illustrate the extent to which the realism of Nature may be fitly applied to a modern building, in place of the grotesque and conventionalized sculptures that hitherto have enjoyed the favor of architects. I think it is safe to say, in America at least, that the day of grotesque "architectural" animal sculpture has passed.

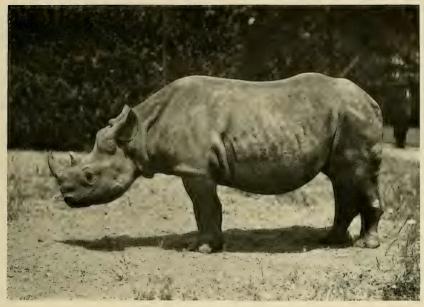
The cornice, or frieze, of the main central building of the Elephant House is ornamented by about twenty sculptured heads of the rhinoceros, tapir and hippopotamus. In the interior of the building, each column in the lines of cage-

fronts bears a small elephant head, in high relief, sculptured in stone.

Each of the eight immense cages, that are to contain elephants and rhinoceroses, has been designed to frame and display its living occupant as perfectly as a frame fits a picture. The vaulted ceilings and large central skylights are particularly well adapted to cages for extralarge animals, and the lighting is quite perfect. The front of each cage-24 feet-is spanned aloft by a single Gustavino arch, and is unspoiled by intermediate columns. Each cage is 24 x 24 feet, which is ample for elephants and rhinoceroses of the largest size. To a height of 6 feet the walls are lined with plates of quarterinch steel; and nothing less powerful than a locomotive could break through or break down the front bars and beams. The outside doors are marvels of strength and smoothness in action. They are of four-inch oak, reinforced with quarter-inch steel plates, and on the inside they are strengthened against attack by three heavy movable beams of steel.



SIDE ELEVATION OF THE ELEPHANT HOUSE. View taken from the south. The yards will occupy the open space to the right and left in front of the building.



AFRICAN TWO-HORNED RHINOCEROS, "VICTORIA."

The Zoological Society has two animals of this species, a male and a female.

On the south side of the building are four cages for elephants, on the north are two cages for rhinoceroses, and two for hippopotami. At each end of the building are two smaller cages, for tapirs or young elephants or rhinoceroses. The hippopotamus cage is provided with a bathing tank, and so are two of the tapir cages. As usual, this building is heated by hot water, and thoroughly ventilated.

Of course each indoor cage has for its occupant a spacious open-air yard, in which the animal may wander at will without the ability to harm any person or thing. For the elephant yards there are two fences. The extra heavy inside fence of steel bars is to prevent the elephants from reaching visitors, and the outside fence, of 5-inch round bars seven feet high, is to prevent visitors from reaching the elephants. The yards and fences cannot be completed earlier than May, 1909, but they will be ready upon the coming of warm weather. In several of the vards some very elaborate and extensive concrete floor work will be necessary to preserve valuable oak trees from the injury that would surely follow the laying of ordinary macadam

paving. The concrete floors are to be raised, to leave the roots of certain trees almost untouched.

The total cost of the Elephant House was \$157,473 exclusive of the fences, yards and walks. The building has been erected by the F. T. Nesbit Company, with Mr. John C. Cofey as superintendent of construction, and it is a fine, perfect and thoroughly satisfactory piece of work. It is doubtful if the City of New York has ever before secured so fine and large a building as this for the really small sum that this one has cost. It is impossible to name the date on which it will be received by the Society, occupied, and opened to the public, but in all probability it will be about November 1, 1908.

W. T. H.

New Mammals:—Since July 1, the following important animals have been received:

- 1 Indian Elephant. 2 Otters.
- I Chimpanzee. 1 Cacomistle.
- I Orang utan. 1 Brown Lemur.
- 1 Malay Tapir, 3 European Roe Deer, 3 Clouded Leopards. 14 Squirrels.



FEMALE INDIAN ELEPHANT "LUNA."

A SCARED ELEPHANT.

N September 10th the Society purchased at Luna Park, Coney Island, a female Indian elephant that is about twelve years of age, seven feet, seven inches in height, and weighs 4,500 pounds. On September 18th, when that animal became both panic-stricken and contrary-minded, she furnished the most exciting episode that has yet occurred in the Zoological Park. The members of the Zoological Society will no doubt be interested in knowing the real facts in this rather remarkable case.

The causes of "Luna's" mental disturbance lay in the fact that naturally she is of a timid disposition, and was suddenly and without warning taken from her old haunts, from her three companions, and from her favorite keeper at Luna Park, to entirely new surroundings, and strange keepers.

For nearly a week she endured the change quite bravely, but at last her nerves gave way before a trifling cause. She was frightened by the sight of the pumas in their cage near the Small-Mammal House, wheeled about, and started to find a safe retreat. The open door of the Reptile House looked inviting, and she

headed for it, taking her two keepers along with her. Of course Keepers Thuman and Bayreuther did their utmost to restrain her, but she paid no attention to their hooks, and deliberately walked into the building. Evidently she thought it was a barn, and possibly she hoped to find within it the three companions she had left in the big and gloomy elephant-barn at Conev Island.

The Reptile House contained about fifty visitors, and naturally the sight of the huge animal walking around the eastern end of the turtle-crawl, created consternation. One woman fainted from fright, and was promptly carried into Mr. Ditmars' office, placed in a chair and revived. Another woman fell while attempting to run away, and cut her forehead against a guard-rail. In a very few minutes the elephant was led out of the building, without having occasioned any damage to it, or to any person; but when she reached the open air she again became panic-stricken. Then, to the amazement of everyone who saw her, she squeezed through the south door of the Tortoise House, and was there found by the Director, trembling with nervousness and fright.

Attempts were made to calm her with food, but she was too excited to eat. In about fifteen minutes she became dissatisfied with the company of the giant tortoises, and squeezed out into the open air. Strong efforts were made to lead or drive her southward toward her home in the Antelope House, and in due process she was started on three different walks leading in that direction. Each time after a hundred feet had been covered her hysteria returned, and she resolutely wheeled from the course. Twice she attempted to re-enter the Reptile House and was prevented, but the third time she made good her second entrance, dragging her keepers with her.

Once more she was halted in the main hall, turned and led out. During the next half hour Keepers Thuman and Bayreuther sought to coax or compel her to go southward to the Antelope House; and first and last, she was tried on five different walks and roads. Finally she made a determined break for the Reptile House, and in spite of all opposition, went in a third time.

By that time Keeper Thuman was well night exhausted, and it was plain that an end of some kind must be reached immediately. The Director at once ordered that "Luna" be chained for the night in the main hall of the Reptile House, fronting the doorway; and in quick time this was accomplished. From her shackled front feet two long chains were run out right and left, and firmly secured to the bases of two guard-rail posts. In that position she was held all night, and remained quiet and well-behaved until morning.

It was hoped that the quiet hours spent in the Reptile House would calm "Luna's" nerves, and that in the early morning she would consent to return to her stall. But the workings of her mind were past finding out, and it was decided to keep her front feet well shackled together. No sooner was one of her anchor chains loosened than the most exciting incident of this episode occurred.

"Luna" swung over to the limit of her remaining chain, within reach of the small table cases of lizards ranged along the south side of the main hall, and deliberately began to wreck them. She pushed off three of the cases, then overturned the table and wrecked four more. While Keeper Thuman was frantically endeavoring to control her, she deliberately set both front feet upon the guard-rail, and broke down a section of it.

By a great effort, "Luna" was then driven out of the building, and in less than fifteen minutes thereafter her front feet were anchored to a tree, her hind legs were closely tied together, she was thrown, "hog-tied" and securely anchored, fore and aft. She struggled long and valiantly, but after a time gave up. Straw was brought and put under her head, and she was left to think matters over. During the day, the Saturday crowds of visitors inspected her briefly and with mild interest, then went their way to see other animals.

At three o'clock "Luna's" favorite keeper, Richard Richards, arrived from Luna Park, and the elephant immediately recognized him. At the Park's closing hour, one of the young African elephants was brought from the Antelope House, to be used as a guide for "Luna" on the journey back to her quarters in the Antelope House. Her leg bonds were transformed into ordinary hobbles, and she was permitted to rise. With her own keeper at her head, she quietly followed "Kartoom" to the Antelope House, entered her stall, and the incident was closed.

In a very few hours, "Luna" again settled down into a quiet, well-behaved beast. On the following day Keeper Thuman made her lie down, rise, and place him upon her back.

Keeper Thuman displayed great courage and persistence in his long struggle with "Luna," and once he narrowly escaped being injured, by accident. It is a satisfaction to be able to report that from first to last the elephant manifested no ill-temper toward anyone; and but for her spiteful breakages in the Reptile House, all of which were quite unnecessary, we could easily forgive both her panic and her stubborness.

W. T. H.

A LARGE SEA TURTLE.

N September 7th, the Aquarium received another specimen of the great harp turtle or leather-back, (Dermochelys coriacea), weighing 840 pounds, nearly 100 pounds more than the one received in June.

This we believe to be the largest specimen of a sea turtle on exhibition anywhere, at least we do not know of an example in any American or European Museum which exceeds it in size. It is not likely that any species of sea turtle exceeds 1,000 pounds in weight. The Aquarium gets one or more harp turtles every summer. They generally die during shipment, or within a few days after arrival, and are turned over to the Museum. When captured along the coast, fishermen report them as weighing from 1,000 to 1,500 pounds, but on the scales they shrink to 700 or 800. Although the harp turtle does not feed in captivity, the present specimen has broken the Aquarium record by living two weeks. But its keeper is not hopeful.

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THE RUBBISH WAR.

During the past three years, the rubbish wilfully and inexcusably thrown upon the walks and lawns of the Zoological Park had become more and more irritating to the nerves of those responsible for cleanliness and good order. During that period, however, we were so busy with the annual rush of construction work that we had no time in which to make a determined campaign against it.

Last spring, however, the auspicious period arrived, and the war that so long had been intended was formally declared. To-day we are prepared to write the first chapter of its history.

The making of wholesale arrests in the Zoological Park, and the haling of a large number of pleasure-seekers before the night court, was painful to contemplate, and would have been still more painful to carry into effect. We decided to avoid those measures, as far as might be possible, by a preliminary campaign of education. To this end we carried out the following program:

In 1907, we finished the placing of about 100 well-appointed rubbish baskets. If the whole truth must be told, the "Bronx Park Basket," an imitation tree-stump in metal, with a movable basket inside, was invented by the Director, with special reference to its use in public parks.

Over each basket was placed a sign, saving "Deposit Here All Refuse." Many other signs had been posted, previous to 1907, forbidding

the throwing of rubbish on the walks.

On May 25th, 150 special cloth signs, printed in English, Yiddish, Italian and German, forbidding the scattering of rubbish, and directing that it be placed in the baskets, under pain of punishment for neglect, were posted so conspicuously that it was impossible for a visitor to enter the Park without seeing at least one.

On May 29th, a manifesto by the Director appeared in several of the newspapers of New York City, formally declaring war on the rubbish-throwing habit, and warning all possible offenders to obey the law of the City, or suffer arrest and punishment. For the publication of our communication, and editorial articles thereon, we are indebted to the following newspapers:

Public Opinion, The Times. The Tribune. Morning Telegraph, Staats Zeitung, Vogue, North Side News. The Independent, Bronx Sentinel. Columbia (S. C.) States

The Herald. Colorado Springs Standard-Union, Gazette. Jewish Daily News, Providence (R. I.) Jewish Morning Journal, Tribune, Plainfield (N. J.) L'Araldo Italiani,

Courrier des Etats-Unis, Courier.

The support received from the Tribune and Times was exceedingly valuable and helpful. and is most gratefully acknowledged.

On Sunday, May 30th, hostilities began in the Ten men of our force were specially detailed to do patrol duty, and instructed to admonish all throwers of rubbish, and compel them instantly to pick up whatever they threw down. It was ordered that the campaign for the education of the public should be carried on without making arrests, so long as substantial progress was perceptible. At the same time, however, officers were in readiness to act, and had the law been resisted, arrests would have swiftly followed. The Commissioner of Police granted us two extra policemen, and Captain George C. Liebers, of the 68th Precinct, entered heartily into the campaign with all the extra men that he could spare. The Society and the general public are greatly indebted to Mr. Hermann W. Merkel, an officer of the Park staff, and also a special police officer, for the vigor with which

he entered into this campaign, and the splendid success of his labors. It would be impossible to say too much in praise of his continuous efforts to preserve order in the Park, and to render every portion of our grounds thoroughly safe for women and children.

The results were immediate and very gratifying. Within a month the amount of waste paper, fruit skins and lunch boxes thrown upon the walks and lawns, and under benches, diminished about seventy-five per cent. Within two months the decrease amounted to about ninetyfive per cent, of the original total; and all this without the making of even one arrest! It was found necessary, however, to prohibit absolutely all persons from sitting or lying upon the grass, for the reason that it was found quite impossible to prevent such persons from leaving rubbish behind them. Owing to the presence of 300 park benches within our grounds, it is not at all necessary for anyone to lounge upon the grass.

Last year, on every Monday morning the Park was a disgraceful sight, and it required the labor of ten men until about two o'clock in the afternoon to gather up the rubbish. Now, by ten o'clock on Monday mornings, four men make the Park thoroughly clean and presentable. What is still more important, the Park is clean during nearly the whole of Sunday, instead of becoming by noon of that day a distressing scene of disorder under foot.

An important lesson has been learned. It has been clearly observed by many persons, that the disorderly period attracted disorderly crowds! When the reform was fully established, the disorderly element seemed to withdraw, and go elsewhere, and there followed a great influx of visitors of a better class, who believe in law and order, and prefer to go only where they can enjoy cleanliness!

Our warfare has received from the best element in New York, constant encouragement. We have on file many letters commending our efforts, and wishing us success. Beyond question, the people of this city pay for, and are entitled to, clean streets and clean parks! Those who disgrace New York by strewing rubbish broadcast, in spite of warnings, should be sternly dealt with. Our streets still are garnished, in the gutters, with waste paper; and the bad habit that leads to it should be taken in hand by the Police Department, and broken up. The first step should be the posting of about 5,000 warnings, printed on linen, as an educational effort. The laws on the subject are ample. The unhindered throwing of rubbish in streets and in parks promotes a spirit of lawlessness

and disorder that easily leads to more serious offenses. In view of all that this city is spending and doing for the comfort and pleasure of the people, the lawless ten per cent. should be forced to obey the laws of decency and good order.

W. T. H.

TWO SUBSCRIPTIONS.

In the last issue of the Bulletin, subscriptions amounting to \$3,510 for the special animal fund were acknowledged. It now affords us much pleasure to report the receipt of a subscription of \$500 from Mr. Nelson Robinson, which brings the total up to \$4,010, and quite fulfils the expectations under which a fund of \$4,000 was asked for.

We also gratefully acknowledge a special subscription of \$250 from Mrs. Frank K. Sturgis, to be devoted to the experiments of Mr. C. William Beebe, Curator of Birds, in the practical determination of the influences affecting the colors of birds. It will be remembered that Mr. Beebe's paper on "Geographic Variations in Birds with Especial Reference to the Effects of Humidity" was published by the Society as Vol. I, Number 1, of "Zoologica," and among ornithologists generally it created a profound sensation.

MISNAMING OF THE ZOOLOGICAL PARK.

Thanks to the persistent efforts of a few men in this city, the New York Zoological Park is now called by the newspapers of the United States generally "Bronx Zoo," "Bronz Zoo," "Bronx Park Zoo," and other combinations equally offensive. We cannot felicitate our friends on having made the corrupted name of an ancient Dutchman greater than that of the city that has given the people of this whole nation a first rank zoological park. It is extremely desirable that the Zoological Park should be called by its right name, and we invite all of the many friends and admirers of the Park to cooperate with us in suppressing the extremely inappropriate and ill-sounding names cited above. Our citizens should all be proud that the name "Zoo" is inappropriate, if only because the Park is planned on a scale which so far exceeds that of any other civic collection in the world.

The attendance at the Aquarium has already passed the two million mark. This year will far exceed any previous year in this respect. Labor Day brought over 21,000 visitors.



MALE SOUTH AMERICAN CONDOR.

NEW WORLD VULTURES.

By C. WILLIAM BEEBE, CURATOR OF BIRDS.

Part I.

THE very name of vulture has come to express unpleasant things and to symbolize evil ways and characteristics. Few people associate these birds otherwise than with surroundings of ill-smelling carrion, but this is most unfair, both to birds in a wild state and to those in captivity. Although it would perhaps be difficult to frame an encomium on all their ways of life, yet vultures are interesting birds and if given opportunity, prove to be as clean feeders as their more noble brethren—the eagles and hawks. If given a choice between two pieces of meat, one fresh and the other spoiled, a vulture will invariably choose the former.

Vultures occupy a unique position in the economy of nature. Although strictly carniverous in diet, they are unable to kill prey for themselves. They have the strong, hooked beak of other raptores, but their toes and claws lack the strong muscles that give to eagles such formidable means of attack. Thus the vultures live Tantalus-like, ever in sight of abundant food and yet unable to satisfy themselves except by the accidental death of some creature.

To cope successfully with these hard condi-

tions, vultures have acquired certain peculiar characteristics. Their prey falls to them in often large quantities but at very irregular intervals, and they are able to take advantage of a time of plenty and gorge themselves to repletion, devouring a surprisingly large amount of food. On the other hand, they possess remarkable powers of fasting, and can retain their strength during a period of five or six weeks abstinence from food.

The third characteristic of vultures relating to their predatory handicap is their wonderful eye-sight. There is little doubt that this surpasses even that of the hawks and eagles, and probably represents the highest development of the power of vision of any living creature. It has been proved conclusively that they find their food by the sense of sight alone, and indeed apparently lack the sense of smell.

During a trip to a wild part of Mexico I once noted an incident which illustrates this unusual vision, and gives a hint of the extreme competition for food which vultures must ever endure.

At the edge of a stream, I once undertook to prepare an armadillo for the pot. His tough skin made it a rather difficult and engrossing task, and for some twenty minutes I did not look up from my work. While on my way to the water I had thoughtlessly noticed a single black speck high up overhead, so usual a sight



SOUTH AMERICAN CONDOR. Head of male bird.

that I hardly remembered it. When at last I arose from my completed work and stretched my cramped limbs, every dead tree and boulder within a wide area held its complement of vultures-black and turkey. It was most uncanny. Their skinny necks were stretched out toward me; many score of red and ebony heads peered through leaves and over rocks and dead limbs, forming a ring of watchful, silent spectators. Overhead the sky was quartered in every direction by dozens of others. Within a few minutes all these birds had come, each guided by the suggestive descent of some brother vulture, who in turn had well interpreted his neighbor's actions. All were waiting patiently for the expected feast. And what a feast! It was the "loaves and fishes" over again without any chance for a miracle. Nearly two hundred birds as large as small turkeys were eagerly waiting for the moment when I should leave to them the remains of one small armadillo!

The collection of New World vultures in the New York Zoological Park is at present complete—that is to say, all five genera of this group are represented by living specimens. The vultures of the Old World are very hawklike, so much so that they are placed in the same order with those birds of prey. But the vultures of our own hemisphere are sufficiently distinct from all other groups to deserve an order of their own. CATHARTIDIFORMES. Perhaps the most marked difference is the absence of a voice in the vultures of the Americas, due to the absence of a syrinx—the avian vocal organ. The Old World birds can scream and voice their emotions in sound, but our vultures

must live ever silent, or utter only the hiss of escaping breath. The single family Cathartidae includes the following genera:

I. South American Condor (Sarcorhamphus gruphus).

II. King Vulture (Gypagus papa).

III. Black Vulture (Catharistes urubu).

IV. Turkey Vulture (Cathartes aura).

V. California Condor (Pseudogryphus californianus).

The completeness of our collection, together with the interest which these little appreciated birds present, has led to the making of a résumé of their habits as far as these are known.

THE SOUTH AMERICAN CONDOR.

A pair of these splendid birds was received at the Zoological Park November 30th, 1899. The female died shortly afterward, but the male is still in perfect health, after nine years of life in New York City. This species has been known to live thirty-three years in captivity. Our bird has been a constant source of attraction to visitors and, peacock-like, enjoys showing himself off to admiring throngs. He has lived outdoors summer and winter, apparently as comfortable in the coldest blizzard as in the hottest summer weather. His chief trait, characteristic indeed of all the larger species of vultures, is a curious spirit of play, exhibited in antics about his keeper or manifested toward other birds in the big flying cage. Formerly his summers were spent in this huge enclosure, where he never made any attempt to injure other birds or even to feed upon the body of any one accidentally killed. At last, however, his play became too rough. He would seize a flamingo by one wing and dance around and around, pulling the terrified bird about, and sometimes throwing it down. For the last few



KING VULTURE. Head of the male bird.

years, the Condor has been kept in his winter cage throughout the year. At midnight on a snowy winter's night I have watched this bird play by himself for a half hour in the moonlight; dancing on the snow, throwing about one of his own giant quills and chasing his shadow; a strange performance explained in no natural history, and one which seems all the more remarkable when we think of this great vulture as the accepted type of a slothful gourmand.

The Condor in the Park is remarkably strong and when it becomes necessary to transfer him, three men are required to hold the great bird fast in a wolf net. He refuses to touch carrion but will eat fresh meat and fish. Like all vultures, he has no grasping power in his feet and claws, and thus his method of feeding is to stand upon his prey, take a firm grip with his powerful hooked beak and pull strongly upward until a small piece of flesh is torn away.

Like other vultures, the flight of the Condor is magnificent, soaring for hours, often hundreds of feet above the highest snow-capped peaks of its native mountains, or swiftly descending thence to the distant speck which its marvellous vision marks out as food. In contrast to others of its family, the South American Condor seems to possess certain predatory instincts. Several individuals are said to band together at times and, rushing at some animal standing near a precipice, frighten it into stampeding to its death, when the birds descend to feed upon its body. This may be the result of the extremity of hunger driving the birds to take desperate measures to avoid starvation.

The Condor lays one or two large white eggs upon a narrow ledge of some inaccessible cliff. Sixty-two years ago an egg was laid and incubated in the Zoological Gardens of London—the only recorded instance of this species breeding in captivity. The chick hatched in fifty-four days but lived only six weeks. From observations of young Condors it seems probable that the nestling spends six or seven months in the nest before it is able to fly. The great wing quills of the Condor come into vogue now and then in the millinery trade, and many thousands of birds are slaughtered yearly to supply this shameful demand.

The courtship of the Condor begins about the first of the year, and extends throughout February. Lacking a mate of his own kind, the bird in our collection shows off to the female griffon vultures or bald eagles. He half raises his splendid wings, curving them around so that all the white markings are brought into view; then he struts back and forth before the object of his attentions. The head is brought forward



KING VULTURE, FEMALE.

and downward while the neck is strained upward in a pronounced curve, the colors of the skin showing brightly at this season. Successive hisses are uttered, the spasmodic exhalation of the breath vibrating throughout the whole bird. At last, with a final prolonged hiss, he sinks down upon his tarsus, closes his wings and the performance is over. Although his eyes are open during the display, he seems in a kind of trance, and takes no notice of what goes on around him.

The strange attitudes which this bird often assumes during sleep are as remarkable and characteristic as is his pronounced playfulness. When perching, his head and wings will sometimes hang straight down—the bird apparently dead and about to fall to the earth. Or again when a visitor perceives this great bird prone upon his back with feet in air, wings half open and beak agape, a hurry call is naturally sent to the keeper to remove the body of his defunct charge; but in a fraction of a second the Condor will spring upon his feet, as much alive as ever.

The word Condor is the Spanish equivalent of the native Peruvian Cuntur. It inhabits the Andes of Ecuador, Peru, Chili, and Patagonia north to the Rio Negro. The size of the Condor has been greatly exaggerated by writers. No less a personage than Alexander von Humboldt was led to believe that these birds sometimes had a spread of wing of fifteen feet. As a matter of fact, with the exception of the California Condor, the South American bird has the greatest expanse of wing of any American land bird, but the average spread of a full grown male is only nine to nine and one-half feet.

The male is distinguished by a large fleshy comb or caruncle which adorns the head. The bare head and neck are wrinkled and of a dull reddish or leaden color, while the glossy black plumage of the body is surmounted by a fluffy collar of softest, whitest down. The body plumage is entirely black, while the exposed portions of the wing feathers are white,—a striking pattern when the bird extends its wide pinions to the morning sun.

THE KING VULTURE.

As the Condor reigns supreme among the great peaks of the southern Andes, so the King Vulture dominates the lowland forest regions. Its range is therefore much more extensive—reaching Paraguay in the south, becoming most abundant in Brazil and showing its splendid form high in air as far north as Mexico. By preference it haunts the wooded banks of rivers and the depths of impenetrable swamps, but from its lofty, aerial outlook it commands many square miles of varied territory, and will be found wherever a promise of a feast comes within its keen range of vision.

The name of "King" is given it because of a wide-spread belief among the native Indians that all other vultures stand in awe of it, and that they invariably remain in the background until the royal appetite is appeased. When wild its food is chiefly carrion—but not apparently from choice, since in captivity it seems to prefer fresh meat.

Although not uncommon in some parts of its range, little has been recorded concerning the life history of the King Vulture. Two white eggs are laid, and the nest is said to be occasionally placed in the hollow of a dead tree.

During the first two or three years of life the colors are dark and obscure, but when fully adult the King Vulture is gorgeous. The head and neck are variegated with bare patches of red and yellow, while prominent folds and wrinkles of skin extend around the crown and down the neck. A bright yellow caruncle decorates the base of the beak and the iris is of a conspicuous white hue. A collar of gray is succeeded by a delicate cream color, and the rest of the body plumage is black and white.

A pair of King Vultures was purchased in June, 1905, and lived in the Zoological Park until a year ago when the male bird died. The female is at present in full color and plumage, and in perfect health. These two birds afford an excellent illustration of that individuality which is so strongly marked a character of most members of this great class of living beings. From first to last the male was wild, shy and nervous, showing no desire to make friends with

his keeper, and resenting every attempt at familiarity. The female bird became tame after a week and ever since has been noted for her quiet ways and confidence in her keeper. She courts attention and is never so contented as when being played with and petted. Two creatures more unlike in temperament could not be imagined.

When, in the tropics, one watches the ever present lesser vultures wheeling and floating like black motes high against the sky, it always brings a thrill of delight when one sees the sun flash out from the white feathers which indicate that the King Vulture is abroad.

(To be continued.)

THE BISON SOCIETY FUND.

THE United States Government has formally selected as the range for the Montana National Bison Herd the site that was recommended by the American Bison Society. It consists of twenty square miles of fine grazing grounds at Ravalli, Montana, with a frontage of seven miles on the Jocko River. The land will cost the government about \$30,000, and the fencing will cost \$10,000 more. Both these sums have been provided by a Congressional appropriation, and in a few months the range will be ready for occupancy.

For three months the President of the Bison Society has been calling for subscriptions of money with which to buy the nucleus herd that the Society is pledged to present to the nation as soon as the range is ready. Despite the difficulties of a canvass in midsummer, the total fund now in hand amounts to \$3,050. This is a very fair beginning,-but it leaves \$7,000 yet to be raised! Every state has been appealed to for contributions, chiefly through the Mayors and Boards of Trade of the cities having a population of 30,000 or above. Thus far not one dollar has been received from or through any one of the 148 mayors who have been called upon for cooperation! Whether the Boards of Trade will do any better, remains to be seen; for this canvass will at least be illuminating.

It was the business interests of this country, represented by men who desired robes to sell at \$2.50 each, that exterminated the bison millions thirty years ago. To-day it is the plain duty of business men of America to lend a hand in the effort that is to leave for future generations of Americans something more than bleaching bones, and records of shameful slaughter.

Members of the Zoological Society are now invited, and also urged, to participate in this work by sending subscriptions, in sums of all sizes from \$1 upward, to W. T. Hornaday, New York Zoological Park. It is urgently desired that the whole amount should be in hand by January 1, 1909. Surely the object is one in which all the members of our Society will be interested. A dollar from each member would mean \$1.600!

Please send it now.

W. T. H.

HEADS AND HORNS ANNUAL.

THE quarto annual publication of the National Collection of Heads and Horns. (Part II), is now in hand. Its special purposes are to acknowledge in detail the gift of the past year, and to further interest sportsmen and travellers in the National Collection that now is being formed here. Its special feature is a description of the famous Reed Collection that was presented to the Society a year ago by Mr. Emerson McMillin. This publication will be mailed to all members of the Zoological Society who may desire to possess it, and who will send their names to Mr. Madison Grant, Secretary, 11 Wall Street.

THE AQUARIUM RESERVOIR.

POR the first time in the history of the Aquarium the sea fishes and other marine exhibits have had a chance to live in their natural element. Under the old regime they could searcely be said to live at all. In fact the majority of them didn't live; they died. It was only by constant replacing that many of the salt water species of fishes could be kept on exhibition. The brackish and unclean water of the harbor—by courtesy called salt water—was never suitable for sea fishes and invertebrates. and only the most hardy survived. Whatever the Aquarium has done in the past, has been accomplished under this fearful handicap.

For three months pure sea water, brought from the open sea and stored in the new reservoir, has been flowing through the tanks. The expensive, troublesome and disheartening death rate has been practically eliminated. Our specimens are active, feed well and look well. Their colors are decidedly brighter than usual. The only losses which now occur are those traceable to injuries received during capture and shipment, while an important number of forms, never successfully exhibited here before, are not only living but apparently thriving.

The system of stored sea water now makes possible at the New York Aquarium anything in the way of marine exhibits that is possible in the aquariums of Europe. For the first time many beautiful sea creatures, hitherto lacking from our collection, are now on exhibition.

Although a good collection of marine invertebrates has not yet been secured, there are a few very interesting species already in the tanks, among which may be mentioned the octopus, the great salt water crayfish, and the so-called Spanish lobster, (Scullarus), from the Bermudas.

Upon the completion of the stored sea water system early in July, the reservoir was filled with 100,000 gallons of pure sea water. For this purpose the water boat "Joseph Moran," of about 15,000 gallons capacity, was chartered. This vessel filled her tanks in the open sea near the Sandy Hook Lightship at the beginning of the flood tide. Returning to the sea wall behind the Aquarium, the water was pumped directly into the new filters, whence it flowed to the reservoir. The harbor water being allowed to flow out of the exhibition tanks, the Aquarium's new bronze pump was started, and the sea fishes were soon swimming in their natural element. The accompaning picture shows the "Moran" behind the Aquarium, pumping her cargo of water into the reservoir. Another picture shows the location of this reservoir in Battery Park, its extent being indicated by the dotted lines.

While the system of stored sea water is a new thing for our Aquarium, it has always been used in the Aquariums of Europe. When properly managed, the water does not need renewal, the original supply being used perpetually.

While the cost of this system amounted to a considerable sum, it is expected to prove economical in the end, as it will result in a great saving of coal during the winter months. Formerly the water, artificially warmed during the winter, was allowed to escape, whereas, under the present method it passes through the filters back to the reservoir. The great amount of steam formerly required to heat the icy water of the harbor will no longer be required. It should require but little steam to maintain an even temperature in the underground reservoir.

The large floor pools at the Aquarium, owing to the low position in which they are placed, are not connected with the reservoir but are still being supplied from the harbor. Owing to the polluted condition of the water of the harbor, it will be necessary before long to discontinue its use entirely, and arrangements will have to be made for a better water system for the floor pools. As these pools are occupied chiefly, at present, by lung-breathing animals such as seals and sea turtles, the water is not so deadly in its effects as it would be to strictly ocean fishes. The few fishes remaining in the pools are brackish-water species which have more endurance in impure water.



THE WATER BOAT "JOSEPH MORAN."

The new water supply in the reservoir has nearly *twice* the salinity of the harbor water and none of its impurities.

The salinity of the open ocean varies only between the limits 1.023 and 1.028, according to location, temperature, evaporation, etc.

In enclosed seas like the Caribbean, Mediterranean and Red Sea it is highest, the salinity being often 1.027 or 1.028. In the Black Sea the surface water is often quite fresh, the bottom water being dense like that of the Mediterranean.

In New York Harbor, at the Battery, our observations vary from 1.008 in winter, to 1.016 in summer when the Hudson is low. Fresh water is represented on the salinometer by 1.000, each unit in the third place, thousands of the density.

The sea water in our reservoir, brought from near Sandy Hook Lightship, has a salinity of 1.021. It would have been more salty if it had been procured farther off shore. C. H. T.

A VISITOR'S OPINION.

THERE are reasons why the letter printed below is of special interest to members of the Zoological Society. The life of a keeper of live animals in a public park is filled with worries and annoyances to an extent quite unknown to the public. Worse even than the perverse ways of the animals themselves are the annoyances to which attendants are almost constantly subjected by the few unruly visitors who wilfully annoy animals, or feed them on the sly.

It is no small achievement for a Zoological Park worker always to "look pleasant," and cheerfully answer his share of the countless inquiries made by visitors. Nevertheless, for nine years, politeness and courtesy to visitors in the Zoological Park have been insisted upon.

The following letter is by no means the only one of its kind that we have received. It was written by a man who is not a member of the Society, and who, so far as known, is an entire stranger to the members of the Zoological Park force.

W. T. H.

POSTAL TELEGRAPH-CABLE COMPANY.

Office of the Superintendent of Tariffs,

Postal Telegraph Building, 253 Broadway, Isaac Smith,

New York City.

Superintendent.

New York, August 17th, 1908.

Mr. WILLIAM T. HORNADAY, Director, Zoological Park,

My DEAR SIR:-

I visited the Bronx Zoo on Saturday, the 15th, and one thing that struck me was the absolute and uniform courtesy on the part of the employees at the Zoo. It was so refreshing to meet and have courteous treatment extended by each employee of the Zoo, spoken to, or of whom any information was asked, that I feel that it is a pleasure to bring the matter to your attention.

I spent about 4 hours at the Zoo, and after being treated so courteously myself, I made it a part of my business to observe whether other people received the same courteous treatment, and I am glad to say that all persons received the same courteous treatment that I did.

Respectfully, I. Smith.



THE AQUARIUM RESERVOIR.

The dotted lines mark the boundaries of the reservoir. The structure in the center is the entrance to the valve room,



FAN PALM (Livistonia sinensis).
Presented by the estate of William Ziegler, through W. S. Champ.

Sale of Deer.—On September 1st, the Zoological Park issued a circular enumerating the deer of various species that were then overcrowding the ranges, and were offered for sale. With but one exception, all the animals offered were born here, and all were well worthy to represent the Park. Of the 21 species of deer in the Park collection, thirteen have bred. The circular is fully illustrated, and contains much information of interest. It will be sent on application to anyone who is interested in the breeding of deer. About one-half of the deer offered have already been sold.

Sambar Deer.—As one of the results of Director Hornaday's efforts to bring about the acclimatization of the Indian sambar deer, (Cervus unicolor), in the South, Dr. Ray V. Pierce, of Buffalo, purchased of the Society a male and three adult females, which have been shipped to St. Vincent Island, in the Gulf of Mexico, near Appalachicola, Florida, and set free. The entire island is owned by Dr. Pierce, and it is

believed that the sambar will do well there. Of course the experiment will be watched with keen interest. The sambar is a great producer of venison, a prolific breeder, and being of sanguine temperament, it seems well adapted to some of the southern forests.

Black Leopard.—Our black leopard is dead. It was given out by the usual secret disseminator of false information, that the animal perished under distressing circumstances, in deadly combat with her male cage-mate. The published accounts of the battle were interesting, and even thrilling, but not so illuminating as the autopsy. The very sudden and quiet death of the black leopard was a puzzle to the keepers until Dr. Blair's autopsy revealed a long, sausage-like piece of fresh meat in the animal's wind-pipe, which completely filled the air passage, and caused quick suffocation. Her cagemate was entirely innocent. No "fight" occurred, and no "truthful ever" reported anything of the kind.

ZOOLOGICAL SOCIETY BULLETIN

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NEW WORLD VULTURES.

By C. WILLIAM BEEBE, CURATOR OF BIRDS,

Part II.

Photographs by Herman T. Bohlman and William I., Finley, By the permission of The Century Co., New York.

THE BLACK VULTURE.

THIS vulture has a wide range in South America, being found as far south as Argentina, and is probably absent only from Patagonia and the higher altitudes of the Andes. It is, however, rather a bird of the sea-coast, and is almost invariably found there in abundance, while in the interior it is outnumbered by the turkey vulture. It is not found in the West Indies, but throughout Central America and Mexico the Black Vulture is universally distributed, and breeds abundantly. In the United States it

is resident in the South Atlantic and Gulf States, breeding as far north as North Carolina and the lower Ohio Valley. It is only very rarely that this bird straggles as far north as New York.

The Black is the smallest of the American vultures, measuring only two feet in length, with a stretch of wing of about four and a half feet. The bare skin of the head and neck is black, as is the whole plumage, this dullness being relieved by the underside of the wings, which are silvery. This small size and the black color have led to its wide-spread name of Carrion Crow.



PARENTS OF "GENERAL" PERCHED NEAR THE NEST IN THE SAN BERNARDINO MOUNTAINS, SOUTHERN CALIFORNIA.



THE SINGLE EGG OF CALIFORNIA CONDOR.

Egg from which "General" was hatched.

To see the Black Vulture at its best—or worst—it is necessary to visit a tropical sea-port. An unwritten law protects these birds throughout their entire range, as the most ignorant Latin-American is well aware of their value and usefulness to mankind. In the north we are familiar with the constant warfare waged against garbage and refuse, especially in our cities. In the easy-going tropics, while such refuse becomes

offensive much sooner than with us, human efforts at cleanliness are ably seconded by the vultures, who act the part of scavengers. They often line the house-tops, ever alert for any scrap which may catch the eye, and a stranger is some-times astonished at having a half dozen of these great black birds swoop down at his very feet, to fight and hiss over some bit of meat.

Every Spanish village and settlement has its quota of Zopilotes, at night retiring to the neighboring forest or roosting by scores upon the bare branches of some large dead tree, and returning in early morning to house-top and street.

The nesting habits of the Black Vulture are of the simplest. Gregarious at all other seasons of the year, it even nests in small colonies. a dozen or twenty pairs often nesting in a circumscribed patch of underbrush. No nest is made, not even a hollow scratched, but the two large handsome eggs are deposited on the ground in a dense growth of yucca, or close to a log among thick scrub. The parents are very wary, and were it not that in time they wear a distinct winding road to and from the eggs, it would be almost impossible to find them. The nesting season in the United States is from March to May.

The eggs measure about two by three inches and are creamy white in color, spotted and blotched with varying shades of brown and lavender.

Both parents share the duties of incubation, which lasts for about a month. The young are clad in fluffy white down, which is gradually shed and replaced by the dark feathers of the adult.



Copyright, 1907, by H. T. Bohlman and Wm. L. Finley. "GENERAL" ONE DAY OLD

THE TURKEY VUL-

This bird is of unusual interest as being the only vulture which occurs more or less regularly in the vicinity of New York City. Many have been observed on Long Island, and in New Jersey individuals are found almost every year as far north as Plainfield and Sandy Hook. Indeed, the news has just been received that they are really abundant every summer at the Delaware Water Gap. At this place there is a herd of five or six hundred deer on "Buckwood," the estate of Mr. Worthington, and the vultures seem to find an abundance of food there, feeding either on the occasional

dead bodies of deer or on other animal matter. As many as ten or a dozen may sometimes be seen in a single flock.

Westward, the Turkey Vulture ranges from the Ohio Valley to the Saskatchewan region and British Columbia. Southward, it extends as far as Mexico. In that country it is replaced by a smaller form which is given the value of a subspecies, Cathartes aura aura. The Falkland Island Turkey Vulture, C. falklandicus, living in Chili and Patagonia, has the skin of the head pink instead of red. The status of the Turkey Vultures of other parts of South America is still under discussion, but there are at least two small forms in the north-eastern part of the continent, one with a yellow head and the other with a pinkish one.

But it is the typical Turkey Buzzard, Cathartes aura septentrionalis (Wied.), with which we are concerned. It is among the most graceful of all flying birds, and is a constant feature in southern skies.

The head and upper part of the neck are bare, wrinkled and bright crimson in color. The bill is white, and the plumage dark brown or black, glossed with green above. In the immature bird the head is covered with a soft



Copyright, 1907, by H. T. Bohlman and Wm. L. Finley. "GENERAL" WHEN EIGHTY-TWO DAYS OF AGE.

down of grayish-brown. The eggs and nesting habits resemble those of the black vulture, although this bird has been known to breed in a deserted hawk's nest high up in a tree.

The Turkey Buzzard is about two and a half feet in length. and has a spread of wing of about six feet. Although these measurements are considerably greater than those of the Black Vulture, vet the latter is heavier in the body. This explains why the Buzzard is the more graceful flier, soaring for hours without a perceptible movement of the wings, while the Black Vulture with its shorter wings and tail must flap frequently in order to

keep its headway and altitude.

The Turkey Buzzards play their full part as scavengers, although not so numerous in the cities of the coast as their blacker brethren.

The statement made in Part I of this article that vultures apparently lack the sense of smell was intended to apply only to the larger species. I have carefully tested the power of scent in the South American and Californian Condors, and the King Vulture, and if present at all it is very slight indeed. In the Black Vulture the sense is appreciable, but even here it appears to function but little, but it reaches a greater degree of development in the Turkey Buzzard.

One experiment will illustrate this. In the large flying cage in the Zoological Park a number of Turkey and Black Vultures are "permanent residents." Three boxes were placed on the ground some distance apart, and the birds fed for a few days in various parts of the cage. Then after several days of fasting, a piece of tainted meat was placed under the central box. Care was taken to go through the farce of placing something under each box so that no visual hints of the location of the meat was conveyed. The vultures were very hungry, yet they did not leave their perches and come to the ground, at



Copyright, 1907, by H. T. Bohlman and Wm. L. Finley.

PARENT CONDOR AND "GENERAL."

The man is stroking the young bird.

though they had watched their keeper intently. He now re-entered and threw down one or two small bits of meat. Within a second or two, almost as the meat left the hand of the keeper, every vulture swooped to the ground and was hissing and struggling for a portion of the food. Twice the Black Vultures walked close about the meat box without appearing to notice the odor which was clearly perceptible, even to persons outside of the cage. A Turkey Vulture walked to leeward, instantly turned and made his way

to the box, which he examined on all sides. He was soon joined by two others of the same species, and all three took up their stations close to the source of the odor. Soon two Black Vultures came up, apparently impelled more by imitation than by actual discovery of the smell. All five birds remained for a long time grouped close to the box. going to it now and then, and examining it carefully. Thus even in the Turkey Vulture the sense of smell is certainly not highly developed, and compared with the sense of sight is defective indeed.

These Buzzards, in certain parts of the South, have

gained notoriety for themselves by actually killing animals. Sheep have to be carefully watched, as the Buzzards will kill the newborn lambs by striking at the eyes. But this recently acquired habit appears to be of very rare occurrence, and should in no wise militate a gainst the incalculably wide-spread value of these birds to mankind in the tronics.

The inception of a habit such as this is easy to explain. On the first days of its existence the new-born lamb lies prostrate and motionless, often for several hours at a time. The Buzzard, seeing it thus, naturally supposes it to be dead, and as these birds usually

consume the eyes of a dead animal before devouring the remainder of the body, they naturally attack these organs first in the young lamb.

If the Turkey Buzzard could be added to our fauna, its graceful soaring form would be a never-ending delight, and if farmers could be made to distinguish it from equally harmless "hen" hawks, or better still be taught to wage war only on the sharp-shinned and cooper hawk, the introduction of these birds might be accomplished.



CALIFORNIA CONDOR "GENERAL" IN THE ZOOLOGICAL PARK.

It is the intention of the writer soon to attempt this. A Tur-key Buzzard escaped in June, 1906, from our Flying Cage and in the following April, after the winter had passed, it returned and soared about our Bird Valley for days. A dozen of these birds will be quartered in an open paddock, their wings clipped and dead stubs provided for them to perch upon. An abundance of food will be provided. and it is hoped that as the moult proceeds and they gradually reacquire the power of flight, they will be content to remain, or at least return vearly to this land of plenty. THE CALIFORNIAN

CONDOR.

When a species of bird becomes so rare that every individual is worthy of a detailed

life history, then indeed its days of existence are numbered. Such is the splendid Condor of California, which once ranged the mountains of the Pacific from Washington to Mexico. When herds of sheep and cattle were corralled among the mountains, poison was used to protect them from the inroads of bears and pumas. The innocent suffered as well, and the Condors were rapidly killed off. Now they are restricted to a comparatively few miles of the coastal ranges in southern and Lower California.

The Californian Condor is one of the largest birds of flight living on the earth to-day. Its length is nearly four feet and the extent of wing averages nine, with an extreme record of eleven feet, four inches. With all this magnificent stretch of wing, the average weight is only twenty pounds, twenty-six being the maximum. The bare head and neck of the adult is bright orange and yellow, and the plumage in general is sooty black. Many of the lesser wing feathers are edged and tipped with gray or white, and the under wing-coverts are pure white.

There are naturally very few of these birds alive in captivity. The Washington Zoological



Copyright, 1907, by H. T. Bohlman and Wm. L. Finley. PARENT CONDOR COMING TO THE NEST.

Park is fortunate enough to possess three. The New York Zoological Society has had two individuals. One was purchased March 14th, 1905, and lived until October 17th of the following year, when some despicable specimen of humanity threw a rubber band into the cage of the Condor. The band was swallowed and resulted in the death of the hird.

Condor number two* was obtained from Mr. Finley on October 6th, 1906, and is still in perfect health, not having as vet acquired the coloring of the adult, although the bird is two and a half years old. An account of the habits in captivity of "General," as this Condor has been named, has already been given in the Zoo-

logical Society Bulletin in Mr. Finley's own words.† We are here able to give a brief résumé of the facts in the life history of this very bird now living at the Zoological Park, up to the time of his capture.

As long ago as 1895 a pair of California Condors were known to be nesting somewhere in a maze of steep canyons among the mountains of southern California. But year after year they eluded all searchers, and not until March 10th, 1906, was the nest discovered. Several persons tramped about the nest, shouting and calling, but not until a pistol was fired in the air did the old bird leave her home.

A huge boulder protruded from the steep mountain-side, and against this leaned a stone slab some ten feet in height. Behind was a cave measuring two by six feet and open at both ends, and on the floor, which was carpeted with

*The facts concerning the life history and the illustrations of this individual are given by permission of Mr. William L. Finley, who has already published them in "The Condor" and "The Century Magazine." †Zoological Society Bulletin No. 24, January, 1907, pages 318-320.

dead leaves, feathers and bits of bark, lay a single great pale bluish-white egg. Within the shell was slowly developing the embryo of General, who, seven months later, was destined to spread his wings and soar about the flying

cage in our Zoological Park.

The next visit to the nest of the Condor was made by Mr. Finley on March 23rd, and most opportunely, as General had just hatched, and lay helpless, a pitiful little object, bald-headed, and scantily clad in white down. The head, neck and feet were pink, and the newly-hatched Condor weighed less than a pound. The mother would not leave her chick and made no resistance when it was lifted out to be photographed. A cold rain was falling, and the chick became chilled and stiff. The adult Condor paid no attention to the young bird until, after being warmed by Mr. Finley into renewed strength, it moved feebly, when the great bird drew it toward her with her bill and crouched gently over it.

It is an interesting fact that the head of the newly-hatched chick and that of the adult are bare of feathers, while in the immature bird the head for the first few years is covered with a

dense coating of furry down.

On April 11th, a third trip was paid to the Condor's nest and the chick was found to have grown rapidly, and was covered with gray instead of white down. The head had become dull vellow, and most interesting of all, it had a voice,-a hoarse tooting, the only real note which any New World Vulture has ever been known to produce. As with brown pelicans, this

is apparently soon lost. On April 25th, when the young bird was thirty-five days old, it was as large as a hen. It showed fight at first, and strenuously objected to being carried out into the sunlight. During this and several later trips the fearlessness of the old birds was most noticeable. The adult birds became used to seeing Mr. Finley about and, as in captivity, would sometimes come within arm's reach and nibble at a glove or shoe. This of course gave splendid opportunities for photographs, and a large series of the old birds, both in flight and repose, was obtained. Mr. Finley says, "In all our study of the home life of these birds, there was never the slightest indication of ferocity on the part of the parents. Their attitude was one of anxiety and solicitude."

When fifty-four days old the young Condor was still clothed in gray down, and not until it was over two months old did the first black

feathers appear on the wings.

On July 5th, when three and a half months of age, General was removed from his nest. At this time he was not half feathered out but weighed over fifteen pounds. On July 7th he was shipped to Portland, Oregon, where he was kept, and by his affectionate disposition won the hearts of his friends.

In October of the same year he reached the New York Zoological Park. May he thrive for many years in his new home, and may his parents rear their future chicks in safety, and help to keep this splendid species from the catastrophe of extermination.

ACCLIMATIZING THE GRAY SQUIRREL.

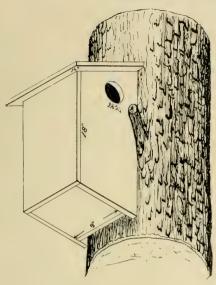
IN view of all circumstances, it is rather surprising that so very few city parks in America contain colonies of gray squirrels. The squirrel itself is beautiful, its manners are very interesting, it accepts Park life with cheerful confidence, and every honest and intelligent human being delights in its acquaintance. To children,

especially, it is a source of delight.

In any public park the society of the gray squirrel is procurable for an initial expenditure of about \$50 and we need not consider the cost per annum for maintenance. How can any village or city invest \$50 or \$75 in any other way which will yield as great dividends per annum as by effectively introducing Sciurus carolinensis? We cannot answer. And quite aside from the daily yield of human delight per squirrel, another great gain must be recorded. Squirrels in a public park teach children and restless boys to enjoy wild creatures without killing them; to love animals for their intelligence and their beauty, rather than as targets for small rifles; in short, to conserve and enjoy, instead of ruthlessly destroying.

How can a park be stocked with gray squirrels? The answer is easy. Make a dozen or twenty boxes, of bark-covered slabs if you have them, but otherwise of plain boards. Build each box like a small chimney, nine inches square inside, and about eighteen inches high. Saw off the upper end on a good slant, and nail on a one-board roof, twelve inches wide, so that it will keep out rain. Above and below, the roof should overhang generously, especially on the lower side. Put a bottom into the lower end, but bore a few small holes in it, to drain it in case water should ever enter the interior. Somewhere at the upper end of the box, in a position easily accessible from the tree trunk, cut a hole about three and a half inches in diameter.

Finally, nail the nest-box tightly in a crotch or against the trunk of any tree you please, about twenty feet from the ground. If red



BOX HOUSE FOR SQUIRRELS. Showing method of attaching to tree trunk.

squirrels attempt to pre-empt your boxes, and drive out the grays, resolutely keep them in check by shooting a few of the former. When too numerous, the red squirrels easily become an intolerable nuisance, chiefly because of their industry in destroying the eggs and nestlings of wild birds.

If the trees of the grove or park are small, very erect, and contain few large horizontal limbs such as are beloved of the gray squirrel, mitigate the situation by nailing up many little brackets, of boards, on which the squirrels can comfortably rest and eat. In a public park that is infested by dogs running at large, it is well to place a few brackets about seven feet from the ground, in order that food may easily be placed thereon, above the reach of the natural squirrel-killers.

Like every other animal, the squirrel thrives best on a mixed diet. Corn is well liked, but only the germ of each grain is eaten. Unless a squirrel is very hungry, about two-thirds of each grain is wasted. Peanuts are good, but they induce habits of laziness. Small hickory nuts and filberts are the best for gray squirrels, because they make the little animal work for his meals, and wear down his incisor teeth. Acorns should be supplied in the autumn, provided the

grove produces no natural crop. Too much easy food fosters an over-development of the incisors, and sometimes leads to an abnormal and distressing development of one pair. Teeth that grow beyond reason, and distress the owner, are easily cut back with a pair of flat-nosed cutting pliers. In long periods of dry weather, or drought in midsummer, every squirrel colony needs a supply of drinking water.

Gray squirrels are easily purchased of Dr. Cecil French, of Washington, or Charles Payne, of Wichita, Kansas, and of many other dealers in live birds and mammals. Their cost price varies from \$9 per dozen to \$25, according to the distance they are to travel from seller to purchaser. If the distance is great, the crates must be made with much more care, and expense, than if the journey is short. Of course the best time to start a colony is in the spring, or summer; but with proper boxes and good care, it is quite safe to start in the autumn.

I regret to say that there are even yet many thousand Americans who regard the gray squirrel as "game," who kill it as such, and actually eat it! There are only four states, I believe, in which this species is protected by law. The gray squirrel bill that Mr. G. O. Shields induced the New York legislature to pass in 1907, was killed by the passive veto of Governor Hughes. In other words, the act lay upon his desk until it died of an attack of limitation.

W. T. H.

THE FIFTEENTH ANNUAL MEETING.

The fifteenth annual meeting of the New York Zoological Society will be held in the South Room of the Hotel Plaza, Fifth Avenue and 58th Street entrance, Tuesday, January 12, 1909, at 8:30 P. M.

Prof. Henry Fairfield Osborn, Vice-President of the Society and Chairman of the Executive Committee, will lay before the Society the plans of the Executive Committee for the protection of the Fauna of North America, with its recommendation that this work be undertaken on a large scale.

Mr. Charles H. Townsend, Director of the New York Aquarium will give a short illustrated address, entitled, "Color Changes in Tropical Fishes, at the New York Aquarium."

Mr. Clinton G. Abbott will deliver an illustrated address on "Expressions of Emotion in Birds, as Portrayed by the Camera,"

Miss Mary C. Dickerson will give an illustrated address on "The Winter Life of Birds and Small Mammals."

By courtesy of the New England Forest, Fish and Game Association, a series of remarkable moving pictures of leaping Atlantic Salmon will be shown by Mr. Richard E. Follett, Vice-President of the Association.

Refreshments will be served.

ZOOLOGICAL SOCIETY BULLETIN.

Edited by the Director of the Zoological Park. Elwin R. Sanborn, Asst. Editor.

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No. 32

JANUARY, 1909

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HOY I FULP MORTON

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GREAT ZOOLOGICAL PARK FOR FRANCE.

For several years we have wondered why Paris, the city of many expositions, has made no move to establish a zoological garden or park on a scale commensurate with the position of France among the great nations. The menagerie at the Jardin des Plantes is in the menagerie class, only: and the Jardin d' Acclimatation never was planned to contain a large and varied zoological collection. In view of the great zoological establishments of New York, Berlin, London, Amsterdam and Antwerp, it has been cause for some surprise that the French capitol has made no move in the same direction.

Last year, when Dr. Gustave Loisel, of Paris, officially commissioned by the Department of Public Instruction of France, spent a week at the New York Zoological Park, studying it with a degree of systematic thoroughness and scholorly intelligence that was to say the least most unusual, it seemed quite certain that the effort was based on a serious purpose that might casily have been named. In our design, methods of development and general administration, there was scarcely a point that Dr. Loisel did not grasp and enter in his records. The workings and methods of our whole establishment were laid bare to him, and of publications, photographs and typewritten statements, we furnished a great supply. This material now makes in Dr. Loisel's report about 50 pages of text, which is embellished by a large series of illustrations, beautifully printed.

An American artist studying in Paris is now our authority for the news that the French government has announced its intention to establish a zoological garden on a grand scale, and devote to its development a very large sum of money. The animal painters and sculptors of Paris have been invited to submit suggestions for the facilities which they desire in the new institution in connection with their work. In pursuance of this request, the artist referred to has recently made a careful personal inspection of the studio in our Lion House, and the specially-invented transfer cage by which animals are placed in it, and withdrawn.

Naturally, we welcome the news from Paris with keen satisfaction. In view of the appalling destruction of wild-animal life throughout the world, there can not be too many zoological gardens and parks; and with all our hearts we wish the French undertaking unbounded success. W. T. H.

BIRD SLAUGHTER AND ITS TERRIBLE RESULTS.

I have recently received a letter from Australia which seems of sufficient general interest and importance for publication. Its theme is the ill effects resulting from the indiscriminate slaughter of birds; by no means a novel subject for debate, but one which is becoming ever more vital to the multiplying myriads of human beings on the earth.

The statement of mine alluded to is, in brief, that if every bird in the world was suddenly to be wiped out of existence, the earth would, within a period of ten years, become uninhabitable for man.

C. W. B.

SYDNEY, NEW SOUTH WALES, AUSTRALIA, MR. C. W. BEEBE, September 12th, 1908.

Dear Sir:-In one of our papers are quoted some remarks of yours on the value of birds to mankind. I wish to afford you certain information, to wit: In the sub-districts of Robertson and Kangaloon in the Illawarra district of New South Wales, what ten years ago was a waving mass of English Cocksfoot and Rye grass, which had been put in gradually as the dense vine scrub was felled and burnt off, is now a barren desert and nine families out of every ten which were renting properties have been compelled to leave the district and take up other lands. This is through the grubs having eaten out the grass by the roots. Ploughing proved to be useless as the grubs ate out the grass just the same. Whilst there recently I was informed that it took three years from the time the grubs were first seen until to-day, to accomplish this complete devastation; in other words, three years ago the grubs began work in that beautiful country of green mountains and running streams.

The birds had all been ruthlessly shot and destroyed in that district and I was amazed at the absence of bird life. The two sub-districts I have mentioned have an area of about thirty square miles, and form a table-land about 1200 feet above sea level. This is a verification of

your statements.

I am, yours faithfully,

RICHARD WALTER TOMALIN.

HUNTING SONG-BIRDS.

Hunting song-birds in the vicinity of the Zoological Park, has narrowed down from numerous offenses, to extremely rare cases. However it has not ceased altogether, and but for the vigilance and courage of our game warden, John Rose, whose reputation in this capacity has become terrifying to evil doers, it would even now be carried on persistently. The offenses whiele now come to our notice are committed by foreigners who apparently are fully aware of the bird laws, but who think they can safely defy them. The character of the work involved in apprehending bird-killers is rather interesting.

On Sunday, November 23d, Warden Rose made a trip toward Hunt's Point, in the vicinity of the Sound, to investigate reported shootings in that locality. Hearing the sound of a gun he stalked through the undergrowth in the direction of the shots. Rose stalked his men to

the vicinity of a barn owned by a man named O'Hare, and came upon two Italians near the barn. Coming out of the bushes in the rear of the barn he spoke to the men, saying he had lost his brother and was hunting for him. Neither of the men had seen this imaginary boy, and the Warden was forced to depart.

Confident that these men were the offenders, Rose made a detour and concealed himself in the rear of the barn. A tedious wait finally resulted in the reappearance of the two men. At the right moment Rose quickly ran from his concealment, and caught one hunter emptying his pockets of dead birds. The other hunter ran into the barn with the gun. Rose drew his revolver, while holding one offender and forced the other to come from concealment. It was only upon a threat to shoot that the men surrendered. When the fact that they were under arrest became fully apparent to them, the bird-killers offered the officer their money and their watches in exchange for their release.

Marching the two men ahead of him, Warden Rose started for the nearest police station. After a walk of nearly two miles a car line was reached, the prisoners placed on board and after much difficulty landed at the Westchester Jail. Judge Welch, of the Eighth Division of City Magistrates' Court, after giving the offenders a severe lecture, held each of them in three hundred dollars bail for trial at Special Sessions. The men gave their names as Vincenzo Sacco and Antonio Guadagno, and their case has not yet been reached.

The birds in the possession of the hunters were retained by Warden Rose as evidence of their guilt. They were seventeen in number, and included the following specimens:—Three starlings, one brown creeper, three myrtle warblers, four chipping sparrows, three song sparrows and three seaside sparrows. Of course all these were intended to be cooked and eaten. E. R. S.

THE OPENING OF THE ELEPHANT HOUSE.

On the nineteenth of November the "new" Elephant House in the Zoological Park was opened to the public with a full complement of specimens, excepting our Hippopotamus. An informal reception and first view of this splendid installation, given in the afternoon to the members of the Society, was the only ceremony which distinguished the completion of the most imposing building of the Park, which is well worthy of being regarded as the grand climax of our building operations.

E. R. S.



THE NEW QUARTERS FOR THE HIPPOPOTAMUS IN THE ELEPHANT HOUSE. The low iron partition through the enclosure separates the main stall from the bathing pool,

HOW THE HIPPOPOTAMUS WAS MOVED.

ACEPTING one, each stall in the Elephant House was occupied on the opening day. The empty one was that of the Hippopotamus, and for several days it remained untenanted. The problem which confronted Mahomet upon viewing the mountain, confronted the Director when the guileless "hippo" refused to leave his quarters in the Antelope House for his new home in the Elephant House.

To the keepers the task had appeared so easy that no special preparations were thought necessary, excepting a means of conveyance. A horse ambulance was secured, large enough to hold the animal's great bulk. The sides of the vehicle were raised to a height of six feet, and the "hippo" was loaded in so easily that our trouble seemingly vanished like mist before the morning sun. No covering was put over the top, because the sides of the van were three feet higher than the animal's back.

In closing the end-gate preparatory to driving off, the noise startled the animal, and with one frantic effort he reared up on his hind legs, and threw his fore legs and head over the side, breaking off the temporary boards. For a moment his plight was really scrious. But by prompt and vigorous exertions on the part of the keepers, the Hippo was rescued,—badly frightened,—and returned to his quarters. The only alternative now was a crate, which was hastily constructed and put into the stall in the Antelope House, until the favorable hour for moving should come.

"Pete's" temper, a most equable one, was entirely unruffled. He viewed with calm indifference the confusion of the departure of the "rhinos" and elephants, and also the strange box in his quarters. Even the shortening of his rations had no visible effect upon his spirits, and the loss of his bath palled on him but a trifle. Such calmness augured well for complete success; merely lead him into his shifting box and away with him; but a trifling task.

Consequently on the morning of the opening day, the keepers assembled at the Antelope House prepared to finish the task with dispatch.



THE CHUTE AT THE ANTELOPE HOUSE.

The keepers are just securing the door of the shifting crate behind the captured "hippo."

The "hippo" regarded these activities with suspicion, and after that the food tempted him only to the extent of hastily securing a mouthful from the crate and backing out to devour it. The attempts to rush him in were savagely repulsed. Next in order the crate was placed in the open doors leading out to the yards, and an attempt made to rope "Pete" and drag him into it. The roundness of his body and limbs, and the smoothness of his skin made it impossible to hold him with a large rope, and a small one could not be used, for fear of injuring the animal.

At this point the Director decided that it would be necessary to build a chute, and therewith force the Hippo into the crate; but the keepers asked permission to try their strategy.

During the following week, on each successive night, by alternate starving

The sliding door of the huge crate was raised, the floor of it was covered with straw and a

bountiful supply of tempting vegetable food was placed in the extreme end. A fast of twelve hours gave to these preparations an air so inviting that "Pete" seemed eager to do his part.

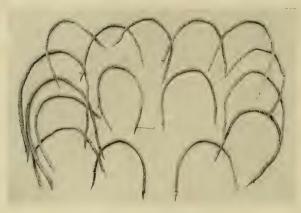
All being ready, "Pete" awaited no invitation to enter. He started precipitately, entered with some caution, elongated himself tremendously and took a mouthful of food. The men were anxious to drop the rear door, but as eighteen inches of "hippo" remained outside, there was no way to do this. The "hippo" secured the food, and backed out. The crate seemed too short: and carpenters were summoned to add two feet, making a total of twelve feet.

and coaxing, the keepers tried in vain to trap him. Even though he was enticed into the crate



ARRIVAL OF THE "HIPPO" AT THE ELEPHANT HOUSE.

The door of the crate was lifted and the animal waiked into the stall without delay.



BOW-SNARES FOR CATCHING SMALL BIRDS.

The one in the left centre is set.

repeatedly, on each occasion he made use of his great strength to shove up the sliding door and escape. Finally it became apparent that this plan could not succeed, and then the Director ordered that his original plan be carried into effect.

The head of the crate was accordingly placed against the outside doors, and a barrier of heavy planking extended from one side of it to the steel cage-bars, in front. On the other side of the crate was erected a similar barrier, but sliding on rollers in such a fashion that it could be drawn quickly forward by a strong rope, also up to the cage bars. This side was left open, and the "hippo," now thoroughly hungry, was easily enticed half way into the crate. Once there, with a quick pull on the moving partition, he was securely fenced in, with his nose pointing straight at the opening of the crate. Whenever he moved forward, ever so little, a bar of heavy pipe was pushed across behind him. Foot by foot his retreat was thus cut off, until finally he was fairly crowded into the trap, the door dropped, and securely fastened. The time of this final operation was twelve minutes. Mr. Merkel's men then loaded the crate into the ambulance, and after a trip to the scales for weighing, "Pete" was unloaded safely in his quarters at the Elephant House, where he speedily plunged into the warm water of his huge new bathing pool.

For moving the rhinoceroses and the hippo, the large horse ambulance of the Bronx Brewers' Association was kindly loaned to the Zoological Society through Mr. John C. Heintz, and it rendered most valuable service.

E. R. S.

ANOTHER BIRD-KILL-ING SCHEME.

THE accompanying illustration is an interesting piece of evidence of the ingenuity and merciless persistence of the song-bird destroyers who still occasionally operate in the woods and meadows above the Zoological Park.

On Sunday, December 6th, a number of snares were found near a small stream by Special Warden Rose during a trip north of the Park. The miscreants had cut runways in the brush,

through which the birds would walk to the water. At the ends of these runs the snares were planted in the ground in such a manner that the birds would be forced to come in contact with them.

The snare is bent like a bow by a double cord fastened to one end and passing through a small hole drilled in the opposite end. About six inches from the end of the cord is a running knot, forming a slip noose. Into this loop is inserted a small twig, making, when the trap is set, a horizontal perch about two inches above the ground. Naturally, as a bird comes to the end of the run, it jumps on the twig, the frail support falls, and the villainous device springs up, breaking the legs, wings or neck of the helpless vietim.

Mr. Rose found and destroyed eight traps. Later on, he put up a covey of quail near this spot, which showed plainly how thoroughly the hunters knew the game. A few days later he returned to this place and found the twenty-one snares which figure in the illustration.

E. R. S.

ALBINOS IN THE ZOOLOGICAL PARK.

A unusual number of albinistic mammals, birds and reptiles are at present on exhibition in the Park. Among the most interesting of the albinos in the collection are a coyote, woodchuck, Carolina squirrel, rhea, and a diamond-back terrapin. There are also several specimens in the collection that incline to-



ALBINO COYOTE.

wards albinism, which are almost as interesting as the fully-white individuals.

Albinism among snakes is not rare. From observations of a great number of litters of various species, the striped snake (Eutaenia sirtalis), shows the most common tendency in this direction. In a litter of forty-four specimens born in the Reptile House there were three perfect albino examples. They were yellowish-white, with pink eyes. For some time after birth these specimens were so translucent that when held to the light the internal organs could easily be traced and the heart could be seen beating.

A fully-matured albino striped snake was recently brought to the Reptile House by a boy, who had captured it as the reptile was crossing Jerome Avenue, in the Borough of the Bronx. This specimen had evidently been living in an isolated patch of woods, and had been seized with a wandering tendency often evinced by snakes. It was of a pale cream color, with pink eyes. The familiar pattern of the species could be faintly traced when the reptile was held in a bright light. The skin of this specimen was so

translucent that after a frog had been caten, its presence was indicated by a distinct dark patch on the otherwise spotless skin of the reptile.

An albino diamond-back terrapin, (Malaco-clemmys palustris), is one of the most curious reptiles ever exhibited in the Park. In this instance albinism is not exhibited to the perfect degree as in the snakes described. Instead of the usual dark, olivaceous shell, the hue is a bright yellow, becoming reddish on the border. The head and legs are almost white, and faintly spotted, but the eyes are not pink, as with most pronounced albinos.

A tendency toward albinism among reptiles sometimes results in startling combinations. A Florida striped snake was once received that exhibited a uniform coat of fiery brick-red. To add to its unusual aspect, this reptile possessed a white tongue, which when in play imparted the effect of the snake ejecting a pale fluid from the mouth.

Our albino mammals are interesting from the fact of their being snowy-white, with limpid pink eyes. The white coyote represents a most unusual phase among wolves. Owing to his be-



TAMANDUA: PREHENSILE-TAILED ANTEATER.

ing quartered in an adjoining cage to the pair of black-phase coyotes from Wyoming, his appearance is particularly impressive. The milk-white gray squirrel presented by Mr. G. O. Shields nearly five years ago is yet living in the Small-Mammal House in good health.

R. L. D.

ITEMS OF INTEREST.

Zoological Park.

The Nighthawk.—Members of the Order MACROCHIRES, including the chimney swifts, hummings and nighthawks, are among the most difficult of birds to keep alive in captivity. This is primarily because of the extreme specialization of their feeding habits, all except the hummingbirds being exclusively flycatchers, seizing their prey while in full flight.

A nighthawk was recently received at the Park, being slightly injured by flying against a telegraph wire. The injury soon healed and the bird, after being forcibly fed for a week, learned to take food from the keeper's hand. It has now been in captivity over a month and has adapted itself to its unusual surroundings in a way which promises long life.

Its favorite position, true to the custom of its family, is lengthwise upon a small prostrate tree-trunk. At the approach of a keeper with food, the bird flies down to the door and greets

the man with its great mouth wide open and wings quivering with eagerness. Pellet after pellet of meat, egg and meal-worms is caught and swallowed, until the bird signifies its satiety by flying back to its perch. Few people have seen a nighthawk or a whippoorwill alive, and this bird attracts a great deal of attention.

Weight of the Elephant House Collection.— The aggregate of the specimens now in the Elephant House, not including the Tapirs, is 20282 pounds; the weights of the individuals being as follows:—Indian Rhinoceros, 1010, pounds; Male African Rhinoceros, 602 pounds, Female African Elephant, 1170 pounds; Male Sudan African Elephant, 1460 pounds; Female, 1290 pounds; Male Indian Elephant, 6800 pounds; and the Female Indian Elephant, 4500 pounds;

In four years "Gunda" has increased in stature from six feet and seven inches to eight feet, two and one-half inches, and his increase in weight amounts to 3060 pounds.

E. R. S.

The Sea Lions.—The Sea-Lions have been removed from their summer pool on Baird Court to the large enclosure just vacated by the Hippopotamus in the Antelope House. Thus far the Sea-Lions have had rather a trying time during the winter season, chiefly on account of



TREE PORCUPINE.

An interesting little porcupine, caught by Curator Beebe in Venezuela.



PIG-TAILED MACAQUE

their predisposition to pneumonia in spring. This large swimming tank now available will keep them quite comfortable until mild weather.

SOME INTERESTING FISHES.

S a gift from Mr. Otto Eggeling, an aquarist of this city, we have placed on exhibition on the main floor of the Reptile House, a tank containing a collection of rare Indian fishes. The most interesting among these is a pair of Climbing Perch, (Anabas scandens). Specimens of this remarkable fish were first imported by Mr. Eggeling to this country in 1903, from Calcutta. The remarkable feature of the life history of this fish, is the fact that it is able to live out of water for hours at a time. While a few other fishes are able to do this to a limited extent, the Climbing Perch is one of the very few which, under certain conditions, leave their natural element and travel overland, or even climb the trunks of trees to a height of six or seven feet.

The gills and fins are provided with sharp teeth which the fishes use with great skill to "walk" over the ground. Whenever the sun evaporates a body of water in which examples of this species live, the fishes emigrate in masses to other waters; or, if these should not be found, they bury themselves in places sufficiently moist to keep them alive until the rains make further progress possible.

The Climbing Perch is found usually in Southern India, Ceylon and the East Indies, in shallow or stagnant water. In the aquarium, it becomes very tame. Owing to its wandering disposition, it is liable to jump from the tank, and for this reason a wire gauze covers the aquarium containing our specimens.

R. L. D.

THE NEW ADMINISTRATION BUILDING.

THE members of the Zoological Society will be pleased to know that the erection of the Administration Building is actually in progress. At the moment of going to press with this number of the Bulletin, the foundations are finished, and the erection of the structural steel is well under way. It is now reasonably certain that in the autumn of 1909 this long-needed building will be ready for practical use. The members of the Society can then enjoy the "Heads and Horns" collection, the Library, Art Gallery, offices and reception rooms, for all of which ample space has been provided.

The building has been located at the northeast corner of Baird Court, directly opposite the Bird House. Architecturally it will be entirely in harmony with the other buildings of Baird Court. E. R. S.

A RARE SERPENT.

ANOTHER specimen of the Bushmaster, (Lachesis mutus), has been placed on exhibition in the Reptile House. Like all of our other specimens of this rare and deadly snake, the present example came from the island of Trinidad. It is the gift of Mr. Edward Wheelock Runyon, who procured the reptile for the purpose of obtaining some of its venom for scientific purposes.

Venom is extracted from a snake in a very simple fashion. A piece of cheesecloth is tied over the top of an ordinary glass tumbler. The snake is captured by pressing its head against the ground with a stick, when it is grasped by the neck, immediately behind the head so that it cannot turn and bite in either direction. Its jaws are then applied to the cheesecloth, through which it bites viciously. When the fangs are through, the operator compresses the reptile's poison glands, emptying out more venom than if



MALAY TAPIR: SADDLE-BACK TAPIR.

So called on account of the conspicuous area of white hair on the back and sides.

the snake bit normally. The venom is pale yellow, and dries rapidly. It then forms into coarse scales which look like amber.

The Bushmaster inhabits tropical America. It is the largest of the poisonous snakes of the New World, and has enormously developed poison-conducting fangs. R. L. D.

THE MALAY TAPIR.

THE Elephant House was opened with the Tapir Family well represented. To transport a tapir all the way from Singapore to New York and complete the voyage with the animal in perfect condition, is a noteworthy achievement. This was accomplished by Captain Percy Watson, of the Steamer "Muncaster Castle," who brought us our first example of the Malay or "Saddle-Back" Tapir, (Tapirus indicus). When the "Muncaster Castle" was coming through the Red Sea, a fire broke out in her hold directly under the heavy tapir cage,

which was fastened to the deck. The steel deck-plates became very hot and after great difficulty the crate was moved to another spot further forward. Soon after that the fire gained in fury, the steel deck became white hot, then caved in. Had not several cruisers been sighted at that moment we would yet be looking for a "Saddle-Back" Tapir. Tons of water were pumped into the vessel's hold from all sides and the fire was conquered.

About five species of Tapirs are known, only one of which is found in the Old World. We now have on exhibition in the Elephant House, the two best-known species. The New World representative is the South American Tapir. (Tapirus terrestris). Of this species we have a mother and young, the latter now so well grown that it shows only very faintly the vivid striping that so strongly characterizes the young when first born. The specimens of both species are exhibited in cages at the eastern end of the Elephant House. R. L. D.

ZOOLOGICAL SOCIETY BULLETIN

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THE BERMUDA AQUARIUM.

A N aquarium located in the tropics has many advantages over one established in a region where cold weather prevails in the winter months. It has not only the marvelously varied life of warm seas to draw upon, but has the supply so close at hand and so abundant that its collections may be changed frequently with little expense.

The temperature of its water supply requires no costly artificial regulation, and the various foods necessary to the welfare of its occupants are always obtainable. The mere changes of the seasons in the north involve a northern aquarium in heavy expenses.

In these respects the aquariums now established in the Bermuda and Hawaiian Islands possess advantages of location which it would be difficult to surpass.

The Bermuda Aquarium is as yet but half completed. It occupies the site of an underground powder magazine, the interior of which is 100 feet in length by 67 feet in width. It is divided into five transverse chambers with arched ceilings of masonry. A lengthwise passage crosses all the transverse chambers, dividing the Aquarium into two sections, the southern being completed. In the ends of each transverse chamber, are either two or three glass-fronted tanks, the tops of which are open to the daylight and the outer air, the chambers themselves being decidedly dark. There are twelve tanks in the completed section. The general effect is suggestive of the Trocadero Aquarium in Paris, which is built in the bottom of an old quarry with all tanks extending up to the level of the grass in the park above.



THE AQUARIUM AND BIOLOGICAL STATION, AGARS ISLAND, BERMUDA.

The entrance to the Aquarium is indicated by the arrow.

From a photograph by L. L. Mowbray.



ENTRANCE, BERMUDA AQUARIUM. Photograph by C. H. Townsend.

With the completion of the tanks across the northern section, the Aquarium will have about thirty tanks, affording space for a considerable variety of fishes and invertebrates. The species at present on exhibition are in general the same tropical forms usually to be seen at the New York Aquarium. In fact the tropical fishes now in New York were secured through the co-operation of the Bermuda Aquarium, a convenient arrangement as it enables us to get fishes that have been "seasoned" in the tanks at Bermuda.

A tank of large and showy sea anemones is one of its attractions, which it may not be easy to repeat in the New York Aquarium, owing to the difficulty of transporting the specimens without injury.

It contains several species, among which are the gill-bearing anemone, (Lebrunea danae), about eighteen inches in diameter which is of a brownish color; the pink-tipped anemone, (Condylactis gigantea), which varies greatly in tint, often yellowish or white with purple-tipped tentacles and spreads out a foot or more; the little red anemone, (Actinia Bermudensis), and the white-specked anemone, (Aiptasia tageter), a flat species with short tentacles. Most of these are shown in the accompanying photograph.

Another picture shows the octopus tank at the Bermuda Aquarium. Additional specimens of these will be procured for the New York Aquarium, it is hoped with better results than attended the shipment made last summer when the specimens were all injured during transportation either by fighting or by a too low temperature of the water.

Around the five transverse chambers composing the Aquarium, runs a narrow moat of masonry called the "lighting passage" when the whole structure was a powder magazine. This moat, four feet wide, extends up to the general level of the ground above—about thirty feet—and is open to the sky. In its bottom all the tanks are built the full width of the passage, the glass fronts facing inward through cuttings in the end walls of each transverse chamber. All tanks are four feet wide and four feet deep, the largest being eight feet long, the others four.

The lighting of the tanks is perfect, since their tops are open to the sky, and the mildness of the climate renders glass roofing for them unnecessary. Rainstorms do not materially affect the salinity of the flowing sea water with which all the tanks are supplied. The lighting of the interior will be greatly improved with the completion of the north side tanks. If additional light is desired it can be secured by cutting light shafts through the ceiling of the central passage.



LIGHTING PASSAGE, BERMUDA AQUARIUM.
View of the lighting passage looking down on the tanks. The grass-covered section to the left is the top of the Aquarium.
Photograph by C. H. Townsend.



OCTOPUS, BERMUDA AQUARIUM. Photograph by L. L. Mowbray.

The ventilation is excellent, each chamber having air tubes extending above the general level of the embankment.

The Aquarium is furnished with sea water from a reservoir of stone and cement holding 40,000 gallons and situated well above the level of the tanks, to which the water flows freely. The reservoir is supplied from a well dug in the coral rock near the shore, the water being pumped through a three-inch pipe, by a two-

horse-power oil engine. A windmill is used as an auxiliary to the engine. The water from the well is always clear.

The Aquarium, as has already been stated, is an underground structure. Viewed from above it is a rectangular, flat-topped, grass-covered mound, or hill, there being eight feet of earth on top of the masonry. It is situated on Agars Island two miles from Hamilton, and is reached by boat or carriage, the latter involving a transfer of about 100 yards by rowboat.

There are several ordinary buildings of masonry on the island, including two cottages as quarters for officers. The old barrack room is now a well-lighted biological laboratory, with adjacent kitchens, washrooms, photographic room and library. Other buildings serve as warerooms. boat houses and offices. The island has a good dock of masonry, and three fresh water reservoirs. It is much in need of a causeway across the reefs, for the greater convenience of visitors.

The Aquarium is a public institution conducted by

the Bermuda Natural History Society, in the interest of science. The proceeds from the admission fees of the Aquarium are devoted to the establishment and maintenance of laboratories for the use of scientists and students from abroad. In 1907-08 there were twenty-nine students of biology from the United States and Canada in the laboratory. Funds are also derived from membership dues and popular subscriptions. The principal donors to the Society



CRIMSON ANEMONE, (Tealia). Photograph by L. B. Spencer.



SEA ANEMONES, BERMUDA AQUARIUM.
Photograph by C. H. Townsend.

have been Mr. James Gordon Bennett, of New York, and Mrs. Reid, of Bermuda.

The Aquarium is in charge of Mr. Louis L. Mowbray, curator of the Bermuda Museum of Natural History. There are at present two caretakers. The establishment, including the biological laboratory, has two motor launches and two row boats. A good-sized sloop with a "well" for living specimens is hired for collecting purposes.

The institution is of great interest locally and is well patronized by the numerous tourists visiting the islands in winter. Local excursion boats call regularly at the Aquarium.

Like the New York Aquarium the structure occupied by the Bermuda Aquarium, had its beginning in military necessities. While the former is the transformation of an old fort, the latter is a converted powder magazine, and both are of ponderous masonry.

A TROPICAL FISH POND.

A GREAT pool of the clearest sea water containing about two hundred brilliantly colored fishes of large size, is one of the sights pointed out to all visitors to the Bermuda Islands.

To call it a fish-pond is scarcely correct. It might better be described as an open-air aquarium, but to the Bermudians it is simply The Devil's Hole. This natural pool appears to be about a hundred feet in diameter, by fifty in depth. It is situated less than a hundred yards from the shore of Harrington Sound and although the tides rise and fall within it, the underground sea connections are not large enough to permit of the escape of the fishes.



THE DEVIL'S HOLE, BERMUDA.

Photograph by W. Weiss.



BULLFROG. Photograph by L. B. Spencer.

It is entirely a work of Nature or rather of the Sea, being merely an exposed sea cavern, the roof of which collapsed long ago. Its ragged coral walls are overhung with trees and vines.

The collection which has been brought together in the Devil's Hole consists chiefly of the larger food fishes of the Bermudas, such as groupers and hinds, with many showy species including angel and parrot-fishes. The large size of the specimens, their richness of coloration, their surprising tameness, and sudden changes of color when food is thrown among them, make an exhibition pleasing in every way.

The accompanying photograph shows only a small portion of the Devil's Hole and its collection of fishes.

FROGS AND FROG-RAISING.

In the Laboratory of the Aquarium there is a shallow wire-covered tank containing about twenty young bullfrogs. They are the representatives of a number of very burly tadpoles which lived in one of the large exhibition tanks last summer and furnished to visitors an object lesson in frog development. There were tadpoles of the plain long-tailed sort, tadpoles with short tails and one pair of legs, tadpoles with stub tails and two pairs of legs, and young frogs with no tails at all. People asked about them and

wanted to know if they were easy to raise, how fast they grew and what was to be done with them. A few of the smallest were eaten by the larger ones, and a few were given away for the use of zoological classes in the universities of the City and so did not get a chance to develop into full-sized croakers, but the rest just stayed where they were and had nothing to do but grow. When winter came they were moved to warmer quarters, where they thrived, and when spring came were fairly good-sized frogs-for eight months' growth.

The keeping of these frogs indoors during the winter is a matter of more importance than may be supposed, since a good many persons seem disposed to undertake frog raising and seek in vain for satisfactory information on frog culture. The Aquarium gets its share of the inquiry, but the fact is, a good system of frog propagation has yet to be worked out. The Pennsylvania Fish Commission is carrying on experiments and had at last accounts, distributed 140,000 young frogs to prospective cultivators, in response to fully a thousand applications from various parts of the State. The Fisheries Bureau at Washington distributes certain information on frogs with brief suggestions on frog culture, but has not yet undertaken to propagate them. Our marshy wastes can be made profitable by frog raising and private as well as public experiment is desirable. The present brief notes on what is known of the subject are presented more in the hope of arousing interest than of stating just how frog raising should be done.

It is not generally known that more frogs are eaten in the United States than in France, and that the annual crop of American frogs sent to market is a large and valuable one. Moreover the frog supply is by no means equal to the demand. According to the last Government statis-



FOUR STAGES OF DEVELOPMENT OF THE FROG.

tics of the fisheries of the Mississippi River and its tributaries, the single item of frogs for that region was stated at 336,049 pounds, valued at \$24,783. The Fish Commissioner of Pennsylvania has recently stated that the annual catch of wild frogs in the United States is worth fully \$200,000 to the consumer. It is officially reported that more frogs are taken in New York than in any other State.

The American bullfrog, (Rana catesbiana), is not only larger than the edible frogs of Europe, but the largest of all frogs. We have also a few other species which grow large enough to be important for food, such as the spring frog, (Rana virescens), the green frog, (Rana clamata), the leopard frog, (Rana pipiens), and some western species; but the bullfrog and the green frog are the largest and most promising. They are also widely distributed, being found throughout the entire Eastern and Middle States.

According to Government fishery statistics, the first value of frogs sent to market averages fourteen cents a pound, but in some sections the prices received are much greater. They also depend largely on the size of the frogs.

The cultivation of frogs in paying quantities is complicated by their peculiar habits, dependence upon live food, cannibalistic tendencies and numerous natural enemies.

The procuring of eggs is not difficult, since they may be found in all sorts of ponds and stagnant waters early in the spring. The eggs are deposited in jelly-like masses in shallow water and are easily dipped up and transferred. They can be hatched in wire-bottomed troughs anchored in flowing water, and will of course hatch in the ponds where they are found if the egg masses are protected. The eggs hatch in a week or two, according to temperature. Toad eggs need not be mistaken for frog eggs, since the former are not laid in masses but in strings. In the tadpole as well as the mature stage, frogs have many natural enemies, both on land and in the water. They are eaten by many kinds of birds, snakes, fishes and small mammals. The larvæ of water beetles are especially destructive to the tadpoles, and if the beetles are not constantly removed with a net, thousands of tadpoles will be destroyed by the larvæ in the pond every day. The feeding of tadpoles is not difficult. They devour dead animal matter of all sorts and will swarm thickly around meat, liver or fish, consuming it rapidly.

After they develop into frogs live food is necessary. They eat worms, beetles, spiders, crickets, grasshoppers, caterpillars, crayfishes, small frogs and fishes, in fact, any living thing they are able to swallow.

Our Aquarium frogs subsist largely on live minnows, but they can also be taught to feed on fresh meat, small strips of which are presented to each frog on the end of a slim stick.

Large specimens have been seen trying to swallow the baby alligators formerly kept in the tank with them. For the pond, however, minnows and tadpoles represent two kinds of foods usually available. Chopped meat placed about the shore of the pond will attract insects and it is said the frogs thus brought in contact with the meat will learn to eat it. The feeding of large numbers of frogs is the chief problem to be worked out.

As the larger species of frogs may remain in the todpole stage a year or more, the prospective frog culturist can gain time by stocking the pond with large tadpoles collected from various localities.

Yearling tadpoles are easily obtained. In my frequent canoe trips along the upper Delaware River I have found them swarming in the warm, shallow side channels and had little difficulty in collecting them with a dip net. In such places I have also secured very large adult frogs with the dip net.

Fish Commissioner Meehan, of Pennsylvania, has recently announced as a result of experiments conducted under his direction, that we are wrong in supposing that the bullfrog and green frog remain a year in the tadpole stage. He finds that under cultivation at least, they mature before autumn and further has obtained some evidence that they spawn twice, the tadpoles of the late spawning being probably the ones that remain undeveloped through the winter. If this is true it means a distinct advance in frog culture.

The pond should have a depth sufficient to protect its bottom from freezing, and the bottom must be soft enough to permit the frogs to bury themselves for their winter sleep. Bullfrogs will require a deeper pond than other species, but all ponds will need shallow margins, where the tadpoles will not only find warmer water, but readier access to the air, both of which facilitate their development into frogs. If kept in deep water, even in aquaria the tadpole stage may be indefinitely prolonged. It

should be protected with a close fence of boards or wire netting not only for the protection of the frogs from enemies, but to prevent their wandering away—a propensity which it is not easy to guard against.

As in the raising of fishes, it is necessary to separate frogs of different sizes, to prevent cannibalism. Several ponds will therefore be required and the small tadpole pond will naturally be the first one constructed, while a half-acre pond will not be too large for well-grown frogs. Ponds will need a margin of grass and bushes, since frogs are land as well as water animals, and like the shelter of shrubbery along shore. They should also have the protection of lily pads.

NEW FUR SEAL SERVICE.

THE administration of the Pribilof Islands in Bering Sea has recently been transferred to the United States Bureau of Fisheries, and the Secretary of the Department of Commerce and Labor has appointed an Advisory Board, which under the general direction of the Bureau, will have charge of all matters of administration with a view to putting the new Fur Seal Service "on the most rational basis possible." Mr. Charles H. Townsend, Director of the New York Aquarium, has been appointed a member. He was a member of President Cleveland's Bering Sea Commission of 1896-97 and was previously, for several years, the government inspector of the fur seal rookeries on the Pribilofs.

FEES FOR MEMBERSHIP.

The fees for membership in the New York Zoological Society are as follows:

Annual membership	.*	10.00
Life membership		200,00
Patron's fee	1	00,000
Founder's fee	5	00.000.
Benefactor's fee	25	,000,00

Information and blank forms for membership may be obtained at the Service Building, at all entrances to the Zoological Park, and at the Secretary's Office, No. 11 Wall Street, New York City.

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APRIL, 1909

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WATER-THROWING HABIT OF FISHES IN THE NEW YORK AQUARIUM.

In a recent publication of the Smithsonian Institution, Dr. Theodore Gill presents a history of the Archer Fish, (Toxotes jaculator), and its feats in shooting drops of water at small insects. This peculiar habit was recorded in 1764, but appears to have lacked verification until 1902, when specimens were kept in aquaria by Zolotnitsky, a Russian ichthyologist.

Ordinarily these captive fishes were able to project drops of water from ten to twenty inches, but sometimes as much as forty inches.

They could shoot drop after drop at an insect lodged on the vegetation close to the water, until it was drenched and fell within their reach. The old fishes are described as much more successful in their aim than the younger ones, but the latter sometimes shot flies with such force that they fell outside of the aquarium. According to Zolotnitsky's account the fishes shot the drops without actually protruding the mouth above the surface.

The water-throwing habit may be more common among fishes than has generally been supposed. Certain fishes living in the New York Aquarium have the habit of coming to the surface and squirting water upon the hands of the attendants working about the tanks, and I have frequently observed it myself. The species in which the habit is most confirmed is the Trunk Fish. (Ostracion triqueter).

When the large exhibition tanks are approached from the service passage, into which their tops open, these fishes frequently come to the surface, and projecting their mouths just above, proceed collectively and individually to squirt water into the air in considerable quantities. About half a teaspoonful at a shot is the amount thrown upward. The fishes are quite tame, and readily nibble at ones fingers. This habit is also frequently practiced by two other small-mouthed fishes with restricted gill openings; the Trigger Fish, (Balistes carolinensis), and the Spiny Boxfish, (Chilomycterus schoepfi), but is more pronounced in the former.

A few months ago when gas lights were placed over the tanks within eight inches of the water, the attendants reported to me that the trunk fishes and the trigger fishes were squirting water at the lights when first turned on and sometimes put them out. I have not observed this myself-doubtless because I did not give instructions to be called when the lights were lit-but the men have undoubtedly seen the fishes do it many times. The trigger fish squirts water forcibly enough to throw it quite out of the tank.

All of these fishes are full of curiosity and seem to be ready to come to the surface to investigate any movement taking place about the open tops of the tanks. The putting out of the lights by the trigger fishes is doubtless accidental, as they squirt water quite as readily when the tanks are not illuminated and apparently do it merely in play.

THE SOLUTION OF THE CARP PROBLEM.

A dozen years ago, only a very few students of the fisheries of the United States, believed that any good could result from the introduction of the European carp into America.

These few were studying the supply of food fishes in our markets and held steadily to their opinion that this marvelously productive fish was needed in our waters, because of the fact that it breeds abundantly in streams which on account of many forms of pollution, are being deserted by native species. Our extensive fish cultural work-the most effective the world has ever seen-is already very seriously hampered by the condition of the rivers wherever the population is dense and manufacturing industries well developed. Some branches of the fish cultural work might as well be abandoned until the American public appreciates the fact that sewage and factory wastes are ruining our waters, and destroying the supply of certain native fishes formerly of great commercial value.

A change cannot be expected very soon. In the meantime we are throwing into the breach more than twenty million pounds of carp a year, caught in thirty-five different States.

The increasing value of carp in the markets is not its only importance; fish culturists everywhere recognize its value as the chief food of some of the best native fishes.

The Fish Commissioner of Pennsylvania, who for many years has maintained that the introduction of carp was a mistake, announces at some length in a recent report, that its growing value for food purposes in the great cities cannot be overlooked. More than two million pounds are sold in Philadelphia yearly, sometimes at prices exceeding ten cents a pound.

New York uses about eight million pounds of carp a year, and the weekly market reports this winter have frequently quoted it at seven cents a pound. Its high price is due in part to the fact that some of the supply is sold *alive*.

The Illinois River contributes very largely to the carp market, and a recent report gives the carp catch of this river, from September 1 to December 15, at nine million pounds, the out-

put going to New York, Philadelphia, Boston, Louisville, Nashville, Chattanooga and Memphis.

The report of the Wisconsin Fish Commission for 1908, states the following respecting the fisheries of the Mississippi River and its tributaries in Wisconsin, the Mississippi being the western boundary of that State: "The carp is the principal fish caught. The fishermen on these waters are making more money by catching and marketing carp than they ever made in past years from all other kinds.

"As an indication of what the Mississippi River carp fisheries amount to a fish dealer located at Bay City, Wisconsin, states before the Fish and Game Committee of the legislature of 1907 that he was one of four principal buyers of fish along the Mississippi River in our State and that during the previous winter he had shipped one hundred and fourteen car loads of fish for which he paid \$127,000.

"Sharp, Spriggles and Amoth of Bay City, Wisconsin, caught, in December, 1907, with one haul of a seine seven hundred feet long, 55,000 pounds of carp for which they received four and one-half cents per pound.

"In the fall of 1907, Mr. L. F. May caught in a single haul of a seine 90,000 pounds of fish, principally carp. From this haul he marketed 71,660 pounds for which he received \$3,171.42. The 'No. 1' carp brought him from five to five and one-half cents per pound. During the year 1907 he marketed 216,822 pounds of fish, over one-fourth of which were dressed before weight was taken. More than three-fourths of the entire catch for the year were carp. His income from fishing during the year exceeded \$10,000. These are instances which have come to my notice. Doubtless others have done as well."

"New York is the principal market for the carp and buffalo fish caught by the Mississippi River fishermen."

The preceding are only a few of the statements respecting the carp fishery in the numerous reports of the year from State commissioners. If the recent yearly increases in the price of carp continue, we shall materially reduce the numbers of the carp and at the same time find it a source of profit and an important item in the supply of fish food.

The "carp problem" of a few years ago is undoubtedly settling itself.



WATER POLLUTION BY A SAWMILL, DELAWARE RIVER.
Photograph by W. F. Patterson.

ANGLING AND WATER POLLUTION.

THE Report of the New York Zoological Society for 1907 contained an article on The Pollution of Streams, in which mention was made of the widespread practice of polluting waters with the refuse of sawmills. Two of the pictures in this number of the BULLETIN show how sawdust is thrown into the Delaware River. One of the mills is situated at Rock Eddy, on the East Branch of the river above Pepacton, New York. The other is also on the East Branch above the mouth of the Beaverkill. Year after year these, and other mills like them, throw tons of their waste into one of the finest black bass and canoeing streams in New York.

It is an amazing fact that there are over six hundred concerns of this sort in the State. Sawdust blackens the water and settles into the gravel beds, making them unsafe for fish eggs and fry. Government experiments have shown that sawdust in the water promotes the growth of fungus on fish eggs and kills both eggs and young fishes.

There can be no more inexcusable practice than that of disposing of sawdust by throwing it into a stream. There are always places on land where it can be deposited without its becoming a nuisance, and it can always be burned. The numerous angling associations of the United States can render a most important service to the country by forming leagues for the enforcement of existing laws against the pollution of waters by sawdust and other wastes injurious to fish life. At present it is almost impossible to prosecute offenders owing to the existence of local

sentiment in favor of the industries which offend. Very little can be expected from local juries. The fight against the pollution of angling waters must be made by powerful State organizations, who can keep up the struggle from a broad point of view, until the justice of their side results in success.

A PHOTOGRAPHIC STUDY OF THE GHOST CRAB.

WHILE spending some days along the extensive sea beaches near Cape Hatteras. I was entertained early and late by the lively behavior of the Sand or Ghost Crabs,



WATER POLLUTION BY A SAWMILL, DELAWARE RIVER.

Photograph by W. F. Patterson.



BURROWS OF THE GHOST CRAB, HATTERAS INLET.

(Ocypoda arenaria), which abounded everywhere, but were particularly numerous near the buried carcases of some porpoises killed a few days before our arrival. There is nothing in the appearance of these marvelously active crabs to indicate their scavenging habits. When captured for close inspection they were always found to be immaculate. Yet they came from far and near and fairly honey-combed the ground with their burrows in order to avail themselves of the new food supply.

The locality was an ideal one for observing them and Mr. Sanborn was requested to make some camera records while I rounded up the subjects for such poses as were possible. By placing the camera flat on the crest of a narrow sand ridge behind which we were concealed, it was possible to photograph the active excavator of a burrow in the very act of tossing out a load of sand. In digging its burrow, which goes down obliquely two or three feet, the crab makes frequent appearances at the surface with sand perhaps as much as half a teaspoonful—carried on the folded claws of one side. After an instant's pause with the eyestalks erect, the sand is tossed out with a quick dash-not pushed out, and the crab dives again underground. The work is carried on steadily and in a few minutes the dark-colored damp sand thrown out-always in the same direction-becomes a conspicuous dump heap on the white, dry sand of the beach. It required patient waiting to catch one outside the entrance in a really good pose.

How those erected eyestalks give the appearance of standing at attention. They are folded down into narrow grooves when he darts into his tunnel. The diameter of the burrow always seems too small for the easy passage of the occupant. The folding up of the great claws and many legs cannot be appreciated until one takes a dead crab in the hands. The way he disposes of them and still

manages to take the burrow on the dead run is admirable.

To surprise a ghost crab on the open beach, head off its wild dash for home and keep up with it on a chase along the hard sand until it could be run down and cornered, meant very lively exercise. Even with the most persistent chasing it seldom attempts to take refuge in the shallow waves washing the beach.



GHOST CRAB ON THE DEFENSIVE.

When utterly tired out and unable to run further, the crab assumes the defensive, with claws raised and eyestalks erect. It strikes furiously at the cap or handkerchief and when the fiere nippers have once made fast, the hold is maintained with tenacity.

The ghost crabs are nearly white in appearance and—for crabs—decidedly ghost-like as they dart about the white beaches in the moonlight.

Another feature of animal life in the Hatteras neighborhood is the Fiddler Crab, (*Uca*

pugilator), which swarms everywhere in the salt marsh areas. They are so numerous that it is almost impossible to avoid treading on their burrows. Unlike the ghost crabs of the open sandy sea beaches, the fiddlers are largely vegetarians, forever carrying bits of algae into their burrows. While the former in excavating, actually throw the sand from the entrance, the latter carry it out some distance.

How the big "fiddles" of the male are folded down out of the way, when they dash under-



GHOST CRAB CLINGING TO A HANDKERCHIEF.

ground, is even more surprising than in the ghost crabs, so small dothe burrows seem when compared with the size of the occupants.

An idea of the abundance of the fiddlers in some places is indicated in the photograph furnished by Mr. Lorillard, which shows many thous and s of them driven together in a favorable locality in Florida.

There are few seaside animals of the small sorts about one's feet, which have more lively habits and engaging ways than these

two species of crabs. A single hour's observation of them seldom fails to interest any one whether possessed of natural history inclinations or not. Probably nothing better could be found for a first lesson in natural history for the young.

Labels.—The Aquarium is indebted to the New Jersey State Museum at Trenton for the loan of numerous electrotypes of turtles and frogs to be used in the illustration of new labels now being printed.







GHOST CRAB ON THE LOOKOUT.



FIDDLER CRABS ON A FLORIDA BEACH.
Photograph by Pierre Lorillard, Jr.

NOTES.

Horseshoe Crab.—Last summer the Aquarium received a large specimen of the Horseshoe Crab, (Limulus), on the back of which were growing a dozen or more good-sized oysters. The specimen is apparently a very old one, with the shell greatly deformed. It had probably lost the power of casting the shell which all crustaceans have, and it may be that very old ones lose the power of shedding altogether, since they are sometimes found with barnacles and ascidians as well as oysters attached to their shells.

Growth of the Sea Horse.—In September the Aquarium received from Atlantic City five specimens of the common sea horse each about two inches in length. Living in the pure sea water now in use, they have grown faster than any

specimens of this species hitherto kept in the building. The temperature of the water has been kept, throughout the winter, at about 72° Fahr., the same as that used for tropical fishes, and all the sea horses now exceed five inches in length. The new sea water system has for nine months given the greatest satisfaction and a larger proportion of marine animals have been carried over the winter than ever before. Under exactly similar conditions the young loggerhead turtles sent by Dr. A. G. Mayer from the Marine Laboratory in Florida in July have more than trebled their size.

Tropical Fishes.—Several species of tropical fishes have for the first time been carried through the winter in good condition and the use of absolutely pure sea water kept at the proper temperature is the secret of success. There has not only been a great saving of specimens but a saving in the cost of operation, as the artificial heating of the reservoir water has cost almost nothing in comparison with the former cost of heating the icy water pumped from the Harbor. The saving in coal has already amounted to several hundred dollars.

The Sunapee or Golden Trout.—In January the Aquarium received from the Sportsman's Show in Boston four specimens of the rare sunapee or golden trout, (Salvelinus aureolus), which are still in good condition. These remarkably beautiful fishes are of great interest to anglers. The entire collection of chars,



FIDDLER CRABS IN SHALLOW WATER.



DOLPHIN, (Delphinus delphis).
Photograph by L. B. Spencer.

trouts and salmons now in the Aquarium is a remarkably good one. While such fishes are easily kept during the winter, there are usually a number of losses during the summer months when the tanks containing northern fishes have to be cooled by refrigeration. The cold water system now in use has many imperfections and should be replaced with something more modern.

Fish Hatchery.—The Aquarium is at present hatching a consignment of eggs of the silver salmon received from the Pacific Coast in February. The quinnat salmon hatched from eggs received from California last summer are still

in splendid condition. Several hundred thousand whitefishes hatched in February have been turned over to the State Fish Commission for planting.

Spiny Lobster.—The very large spiny lobsters received last summer from Bermuda were gradually lost during the winter on account of imperfect shedding. While these animals had no difficulty in casting off the carapace and tail portions they did not seem to be able to free their legs.

While the sea water supply is now very nearly perfect, it is still impossible to furnish all the denizens of the tanks with the foods to which they are accustomed in the tropics, and this difficulty may have had something to do with the loss of the crayfishes.

Box Crabs.—The interesting and oddly-shaped box crabs, (Calappa flammea), received from Bermuda last summer have thrived in captivity. These crabs, usually

motionless during the day, are often quite active in the evening. The species differs greatly in appearance from any crab hitherto exhibited at the Aquarium; the first pair of legs are remarkably broad, and when folded, form a shield to the front of the body.

Hawksbill Turtle.—In March the Aquarium received an unusually large and handsome specimen of the hawksbill or tortoise-shell turtle from Bermuda.

Color Changes of Fishes.—In February the Director of the New York Aquarium spent a



 $\begin{array}{c} \text{HORSESHOE CRAB, WITH LIVING OYSTERS} \text{ ATTACHED.} \\ \text{Photograph by L. B. Spencer.} \end{array}$



LONG-EARED SUNFISH, NEW YORK AQUARIUM. Flashlight photograph by Lazarnick.

week in Bermuda studying the instantaneous color changes of tropical fishes, an account of which will be published in the forthcoming Report of the New York Zoological Society. He devoted some time to the equipment and methods of the new Bermuda Aquarium, which will be fully described in a work he is preparing on the construction and operation of public aquariums in general. Arrangements were made for the shipment of specimens to the New York Aquarium in June.

The Ocean Sunfish.—Mr. George Pollock, of New York, sent to the Aquarium a photograph of the ocean sunfish or head-fish, (Mola), recently taken at Palm Beach, Florida, which is reproduced in this Bulletin. The specimen weighed only sixty pounds. This strange fish which is an inhabitant of tropical seas, often comes as far north on our coasts as California and Massachusetts. It reaches the enormous weight of eighteen hundred pounds. In appearance it seems to be merely a head with fins; the dorsal and anal are placed well back and the tail is reduced to a mere fringe connecting them.

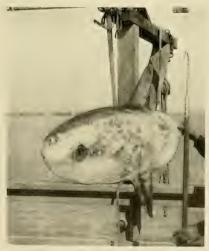
Attendance.—The attendance at the New York Aquarium for January, February and

March was 519.468, an increase of 59,909 as compared with the same months of last year. An attendance of over half a million in three winter months is remarkable and breaks the Aquarium's own record.

An excellent photograph of one of the dolphins which lived in the Aquarium last summer, appears in this number of the Bulletin, contributed by Mr. Spencer, who also made the photographs of the large crimson sea anemone, (Tealia crassicornis), and the bullfrog.

Mr. N. Lazarnick contributes the attractive flashlight of the long-eared sunfishes, (*Lepomis auritus*).

Leatherback Turtle.—This BULLETIN contains a photograph of the great Leatherback turtle which last summer lived for some weeks



OCEAN SUNFISH, (Mola mola), PALM BEACH, FLORIDA Photograph by George Pollock.



LEATHERBACK TURTLE, NEW YORK AQUARIUM.

Photograph by C. H. Townsend.

in the Aquarium. It weighed 840 pounds and was large enough to accommodate the four riders shown in the picture, with perhaps room for another up behind. The specimen has been mounted for the Museum of the Brooklyn Institute of Arts and Sciences and a plaster cast is being prepared for exhibition in the Aquarium. The leatherback is the largest of all existing turtles and this particular specimen is believed to be the largest on exhibition anywhere.

for each child under twelve years of age. Tickets are sold only at the entrances.

Opening and Closing.— From May 1st to November 1st the entrance-gates will be opened at 9 A. M. and closed half an hour before sunset. From November 1st to May 1st, the gates will open at 10 A. M.

Admission to the Aquarium is confined to members on Monday forenoons. It is open to the public from April 1 to October 31, 9 A. M. to 5 P. M., and from November 1 to March 31, 10 A. M. to 4 P. M. When a holiday occurs on Monday,

the forenoon will be available to the public.

Correspondence. — A correspondent from Pennsylvania writes: "Can you tell me where I can get an electric eel to be used for medicine to cure my brother of drinking. It must be put into a vial with the other ingredients until dead, then taken out and the medicine given. I enclose stamped envelope for reply."

GENERAL INFORMA-TION.

Admission to the Park.

—On all holidays and on Sunday, Tuesday, Wednesday, Friday, and Saturday, admission to the Zoological Park is free.

On every Monday and Thursday, save when either of these days falls on a holiday, only members of the Society, and persons holding tickets from the Society, are admitted free. All others pay twenty-five cents for each adult, and fifteen cents



LEATHERBACK TURTLE, NEW YORK AQUARIUM.

Photograph by C. H. Townsend.

WILD-LIFE PRESERVATION NUMBER ZOOLOGICAL SOCIETY BULLETIN

No. 34

Published by the New York Zoological Society

June, 1909

PREPARED BY WILLIAM T. HORNADAY, DIRECTOR

A GREAT YEAR FOR GAME PRESERVES.

N view of the fair certainty that in twenty-five years more, practically all big game will have disappeared everywhere westward of the Mississippi River outside of the rigidly protected areas, the making of state and national game preserves is of paramount importance.

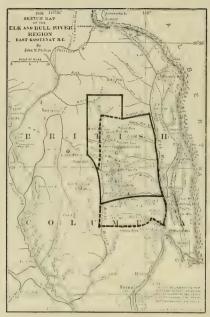
As a duty which it owes to the people of America, and to science, the preservation of wild life is one of the three great objects to which the New York Zoological Society has constantly devoted attention and effort.

The past twelve months have produced grand results in the making of hard-and-fast reserves of great size for the perpetuation of wild life. We wonder whether any other year ever will produce, for Americans, an equal result. The following list shows the most important items, and the date on which the consummation of each was completed:

May 23,1908. Montana National Bison Range. November 15, 1908. Goat Mountain Park, British Columbia.



PHILLIPS PEAK AND GOAT PASS, 11,000 FEET HIGH.
The center of permanent breeding grounds of an abundance of Mountain Goats, Sheep and Grizzly Bears.



BRITISH COLUMBIA'S NEW GAME PRESERVE.

Dotted lines show the original proposition.

March 3, 1909. Mt. Olympus National Monument, Washington.

April 13, 1909. Superior National Forest and Game Preserve.

We may well rejoice over the year's record. The four great sanctuaries named above will greatly promote the permanence on this continent of the moose, wapiti, bison, mountain goat and sheep, grizzly bear, black bear and mule deer. We will briefly summarize the most important facts regarding each of the four new preserves.

THE MONTANA NATIONAL BISON RANGE,

This fenced preserve was established by a special act of Congress, on May 23, 1908, at the solicitation of the American Bison Society. In response to the offer of the Society to present to the government the nucleus herd of bison, Congress has appropriated, in all, \$30,000 for the purchase from the Flathead Indians of twenty-eight square miles of grazing grounds at Ravalli, Montana, and \$13,000 with which to defray the cost of fencing it suitably. In addition to the bison, this fenced range will be stocked as soon as possible with prong-

horned antelope. The success of the bison in self-sustaining herds, on that range, is by no means an experiment. It is a demonstrated certainty.

The Forest Service of the Department of Agriculture is now at work erecting the fence around this great range, and it is hoped that it can be completed by October 1, in order that the Bison Society gift herd of about fifty-four pure-blood bison can then be delivered upon the range, and installed. This range can easily maintain 1,000 bison, and it is fairly certain that many members of the Bison Society will live to see that number of individuals grazing upon it.

The Bison Society has raised \$10,560 in cash with which to purchase about forty-two bison, and fourteen head have been presented to the Society by their owners, for the benefit of the Montana herd.

BRITISH COLUMBIA'S NEW GAME PRESERVE.

On November 15, 1908, the Legislative Council of British Columbia issued a proclamation which converts into an absolute game preserve about 450 square miles of territory between the Elk and Bull Rivers, and around Monro Lake. With a subtraction on the south and an important addition on the northwest, it is otherwise the "Goat Mountain Park" territory, for the preservation of which John M. Phillips and William T. Hornaday for two years or more waged a strenuous campaign of education and appeal. In the final half of the struggle (against active opposition) they were joined by some of the most prominent citizens of Fernie,-Mayor W. W. Tuttle, J. B. Turney and Hon. W. R. Ross, M. P .- and by Warburton Pike, Clive Phillips-Wolley, and other sportsmen and naturalists in Victoria. The Provincial Game Warden, A. Bryan Williams, played a highly important part in the accomplishment of the final result, and it was he who established the boundaries.

The result is a great victory for the mountain goat, mountain sheep, elk, mule deer, and grizzly bear. The area in question is an ideal home for the goat and sheep. Of the former, the new game preserve contains about one thousand head, and of the latter at least two hundred, all of them living and breeding there, all the year round. The scenery of the preserve is surpassingly fine, and it is well stocked with many important forms of Rocky Mountain mammals and birds. It was in this region that Professor Henry F. Osborn and Mr. Phillips obtained in 1905 their famous photographs of living mountain goats in their haunts.



MONRO LAKE, IN THE NEW PRESERVE CREATED BY BRITISH COLUMBIA.

This is the center of fine breeding grounds for Elk and Mule Deer.

The making of this preserve is a good object lesson in wild-life preservation. It shows what can be accomplished by two industrious and determined men, particularly when one of them has an official connection with an institution like the New York Zoological Society. This fact is worthy of mention, not by any means as an award of credit to Messrs. Phillips and Hornaday,—for in any event, their part in the matter will be promptly and thoroughly forgotten by the public,—but as an encouragement to other men who might, could, would or should render similar service to the wild-life of America.

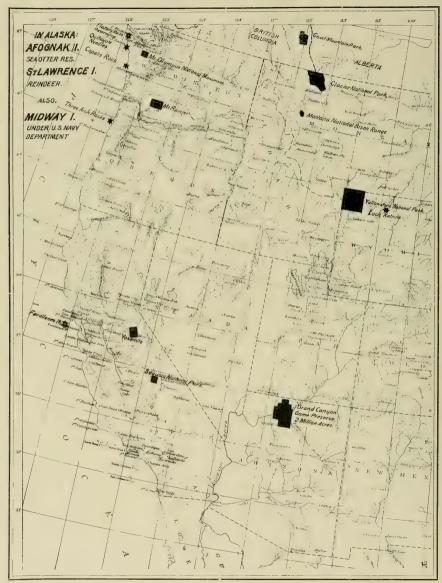
A map showing the location of this preserve is given herewith.

MT. OLYMPUS NATIONAL MONUMENT.

For at least six years the advocates of the preservation of American wild life and forests have desired that the grand mountain territory around Mount Olympus, in northwestern Washington, should be established as a national forest and game preserve. In addition to the preservation of the forests, it was greatly desired that the remnant bands of Olympic wapiti (described as Cervus canadensis roosevelti) should be perpetuated. In Congress, two determined efforts were made in behalf of the region referred to, but both were defeated by the enemies of forests and wild life.

By a really fine display of forethought and energy in the last days of the last session of Congress, and under the authority of clearly-defined statute laws, the end long desired was accomplished. The Olympic national forest and game preserve—under another name—is now an accomplished fact; and it is both a duty and a pleasure to give Americans an opportunity to award the credit for it to the man who thought it out, and brought it about,—Dr. Theodore S. Palmer, Assistant Chief of the Biological Survey, Department of Agriculture.

In an auspicious moment, Dr. Palmer thought of a law under which it would be both proper



NATIONAL PARKS AND GAME PRESERVES, AND BIRD REFUGES.

and right to bring the desired preserve into existence. The law referred to expressly clothes the President of the United States with power to preserve any monumental feature of nature which it clearly is the duty of the state to preserve for all time from the hands of the spoilers. Already several "national monuments" have been preserved by executive order, of course with the previous concurrence of a number of high departmental officers who by law are empowered to sit in judgment on all such proposals.

With the enthusiastic approval and assistance of Representative William E. Humphrey, of Scattle, Dr. Palmer set in motion the machinery necessary to the carrying of the matter before the President in proper form, and kept it going, with the result that on March 3, President Roosevelt affixed his signature to the document that closed the circuit.

Thus was created the Mount Olympus National Monument, preserving forever 600,000 acres of magnificent mountains, valleys, glaciers, streams and forests, and all the wild creatures living therein and thereon. The people of the state of Washington have good reason to rejoice in the fact that their most highly-prized scenic wonderland, and the last survivors of the wapiti

in that state, are now preserved for all coming time. At the same time, we congratulate Dr. Palmer on the brilliant success of his initiative.

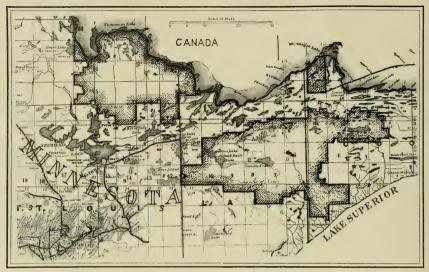
THE SUPERIOR NATIONAL GAME AND FOREST PRESERVE.

The people of Minnesota long have desired that a certain great tract of wilderness in the extreme northern portion of that state, now well stocked with moose and deer, should be established as a game and forest preserve. Unfortunately, however, the national government could go no farther than to withdraw the lands (and waters) from entry, and declare it a forest reserve. At the right moment, some bright genius proposed that the national government should by executive order create a "forest reserve," and then that the legislature of Minnesota should pass an act providing that every national forest of that state should also be regarded as a state game preserve!

Both those things were done,—almost as soon as said! Mr. Carlos Avery, the Executive Agent of the Board of Game and Fish Commissioners of Minnesota is entitled to great credit for the action of his state, and we have to thank Mr. Gifford Pinchot and President Roosevelt for the executive action that represented the first half of the effort.



NATIONAL BIRD REFUGES, ESTABLISHED 1903-1908.



SUPERIOR NATIONAL GAME AND FOREST PRESERVE.

The new Superior Preserve is valuable as a game and forest reserve, and nothing else. It is a wilderness of small lakes, marshes, creeks, hummocks of land, scrubby timber, and practically nothing of commercial value. But the wilderness contains many moose, and zoologically, it is to all practical purposes a moose preserve.

In 1908 Mr. Avery saw fifty-one moose in three days, Mr. Fullerton saw 183 in nine days, and Mr. Fullerton estimates the total number of moose in Minnesota as a whole at 10,000 head.

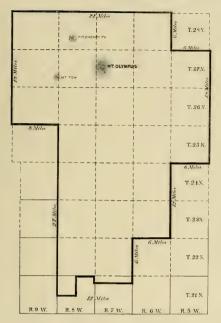
In area it contains nearly 909,743 acres, and its boundaries are shown (for the first time in a periodical) on the accompanying map. The creation of this great preserve was finished on April 13, 1909.

In this connection, it is of interest to notice briefly another national game preserve of recent creation, and to publish a map showing its location.

THE GRAND CANON NATIONAL GAME PRESERVE.

Even to most persons who are interested in conservation work it will be fresh news that in northern Arizona the Government has established a game and forest preserve equal in scenic wonders as well as in area to the Yellowstone National Park. It is called the Grand Cañon National Game Preserve, and it consists of the Kaibab Plateau and Buckskin Mountain on the north, the first portion of the cañon of the Colorado, and also a great area southward thereof. It contains, in round numbers, 2,019,000 acres, or 3311 square miles. It includes all of the area formerly comprising the "Grand Cañon National Monument," and fully twice as much more.

The country south of the Colorado Cañon is comparatively well known, but to most Americans the Kaibab Plateau is a veritable terra incognita. It is in that wild and rugged region of broken country, rocks, hills, valleys, brush and a splendid pine-clad mountain plateau looming up over all, that "Buffalo" Jones has located his herd of American bison and "cattaloes," for his latest experiment in breeding a valuable strain of bison blood into range cattle. Fortunately for those interested, there has recently been published about that region a book of thrilling interest. It is Zane Gray's "Last of the Plainsmen," published by the Outing Publishing Company. It is valuable as a general view of a wild and almost unknown region, and



MT. OLYMPUS NATIONAL PRESERVE.

also as a record of the almost incredible exploits of Mr. Jones in catching alive *nine* pumas, by strength of nerve, arm and lasso!

Already the Grand Cañon Preserve contains a few mountain sheep, many mule deer,—and far too many "mountain lions." Buckskin Mountain and its environs would make a fine sanctuary for elk, but it would be necessary to introduce them. The lower slopes would graze ten thousand bison, but very few persons would ever see them. With the lapse of time—and cattaloes—it will be in order for the National Government to purchase outright the pure-blood bison of Mr. Jones and his partners, and let them alone where they are, to found another national herd.

HOPE FOR THE ANTELOPE.

DOTH Montana and Wyoming have recently enacted new laws providing absolute protection for the prong-horned antelope for a series of years. This is a great achievement, for the reason that the chain of protection for that species is now nearly complete. In no

state or territory is it now legal to hunt antelope, at any time; and the penalties for the lawbreakers are severe.

It is now in order to work for the enforcement of the antelope laws; and the first thing to do is to reach all ranchmen of antelope countries with a strong appeal to their patriotism and humanity for the creation of a new cowboy sentiment in behalf of antelope preservation.

On January 26 the Arizona Daily Star published the news that after an absence of nearly 20 years a band of antelope, containing nearly 50 head, had been seen in Pima County, between the Comobabi and Baboquivari Mountains. This is one of the results of the ten years of close protection that Arizona wisely has accorded her most interesting desert species. All honor to Arizona!

The laws for the antelope are now sufficient. The next thing to provide is for their enforcement. We must reach the stockmen, and ask them to do that which no one else can do! If they will say, "Cowboys, there must be no more killing of antelope. We wish you to protect them, at all times, and in all possible ways!"—then protected they will be!

There are yet remaining alive probably 5,000 antelope, all told; but we hope that the days of antelope hunting have ended forever. The remnant bands should now be as safe from attack by man as are the animals of a zoological park. The boys of the West should be taught in their schools that it is a sin to kill an antelope. Too many thousand square miles of Western plains are now barren and lifeless because the beautiful prong-horn is gone from them. With range cattle and sheep swarming on ten thousand hills, the poor little "saddle" of the prong-horn is no longer needed by anyone as human food.

The antelope is one of our greatest American zoological curiosities,—unique, odd, isolated. It has no near relatives anywhere on this earth. Let it alone, and it will take care of itself, and harm nothing. As an ornament to gray and melancholy wastes, as beautiful wild-life amid barrenness, as the companion of the plainsman, and as the great American oddity, it deserves to live and be let alone.

It is greatly to the national credit that we now are able to publish to the world the news that in every portion of its range throughout the United States the prong-horn is absolutely protected, and for it there is no open season. If we can but maintain this condition, and stop unlawful killing by the residents of antelope territory, it may really happen that the Americans of A. D. 1935 will find the antelope still living in our land.

THE FUTURE OF OUR FAUNA. By Madison Grant.

THE growth of sentiment in favor of socalled protection of game has been extremely rapid in the United States in recent years, but unfortunately the destruction of the game in question has proceeded in most cases with even greater celerity. The object of the first game laws was usually the establishment of close seasons, covering for the most part those months during which the young were born and nourished. To these close seasons were soon added restrictions regulating the number of animals to be killed and the mode of hunting, forbidding for example, crusting moose, hounding deer, and the use of swivel guns for ducks. These measures in turn proved inadequate to prevent the rapid diminution of game, so that finally the market itself was attacked, and the trade in skins and meat was either prohibited or strictly limited.

About this time it became evident that some species were either locally exterminated or on the verge of extinction, and there began to appear on the statutes of various states, laws forbidding the killing of certain animals for various periods, usually about five years. Some of these laws were effective where the district in which the prohibition was put into effect adjoined one where game still abounded, and from which a supply could be drawn. Little by little, in this way, the public became accustomed to the fact that in certain places certain animals could not be legally killed at any season, and this naturally led to the next step, viz .-the complete stopping of the killing or capture of all animals in certain restricted localities known as game refuges or sanctuaries. These refuges, the writer believes, are the final solution of game protection. All the other expedients and devices named must prove to be inadequate, except in certain favored localities like Long Island for deer, and perhaps Maine and the Maritime Provinces for moose. Sooner or later the development and population of the country at large will reach a point when there will be no room for the larger forms of mammalian life, although there is no reason why game-birds and fish should not continue to abound. These larger forms therefore can only be handed down permanently in refuges like the Yellowstone Park, and these must be established throughout the length and breadth of North America, especially in regions where forest reserves are necessary for the control of the water supply. Whatever hunting the future generations will enjoy must be on the borders of these reserves, which, if successful, will provide an overflow of game sufficient to stock the surrounding country.

The fact is, that the time is close at hand when we must abridge, or altogether take away the old right to bear firearms and use them on all living creatures. In place of this we must substitute Old World conditions, which appear to be consistent with the preservation of abundant wild-life living on friendly terms with a dense human population, as in India. This is an ideal condition which we Americans must endeavor to establish in this country, if we wish to continue to enjoy the spectacle of animated nature around us. To bring about such a change in public opinion is a gigantic undertaking, and it may be necessary in many places to go through, in our characteristic national way, the process of complete destruction of the animals we have, and the restocking of the country with new and perhaps in many cases with foreign and less attractive forms.

To avoid this last misfortune, the continuation of the native wild stock through the medium of game refuges is absolutely essential. The Adirondacks, for instance, where nearly every native and most of the visitors feel it obligatory to carry around a repeating rifle and to use it on every living thing in season, and on pretty nearly everything except deer out of season, consist now of almost lifeless forests and lakes. If we could once for a definite period of years do away with the habit of rifle carrying, we probably could restore a great deal of the pristine beauty of the North Woods. The natives there have advanced to an imperfect belief in game protection, but still regard "varmints" or vermin as something to be destroyed on all occasions, and used as living targets. The definition of the word vermin most popular in the Adirondacks, seems to be the one recently used in Congress where a western representative stated that, "the term vermin included everything that could not be eaten, differing thus from game, which was edible."

The New York Zoological Society is prepared to continue to support and urge such further restrictive measures as may be from time to time found desirable, but it believes that, looking a generation or two into the future, the only true and permanent solution lies not so much in further legislation, but in a strict and continuous enforcement of existing laws; and most particularly in the creation throughout the country in all desirable spots, especially in mountains and on islands, of sanctuaries for wild-life, where neither rifle, nor fire, nor dog may menace the safety or disturb the breeding

of the wild creatures. Lastly, the Society believes in discouraging and limiting the use of firearms throughout the country at large. The necessity for carrying firearms has now passed away forever. In fact, it has lasted too long in the United States, as a comparative study of the development and civilization of our western states with those of western Canada, will easily demonstrate.

From the day when man became man and walked erect, some four or five hundred thousand years ago, down to our own day and generation, he has been engaged in a ceaseless battle with his fellow inhabitants of the earth. Down to the dawn of the historical period, this battle, waged at first against the sabre-tooth tiger, the cave bear and the hyenadon, was more than doubtful, and only man's co-operation with his fellows, his protection by fire, and his use of dogs as hunting allies, gave him the victory. The struggle continued with renewed violence whenever man entered upon new territory. Century by century his organization became better and his weapons more effective, until during the Neolithic period, his superiority over the brutes became definite. From that period, man's advance to the complete mastery of the globe has advanced by leaps and bounds, and this generation has the unique privilege of standing literally at the close of this long battle, and at the opening of the new period, which is immediately ahead of us, when man will share the earth only with such survivors of the world's fauna as he may choose to tolerate. From present appearances the only exception to this will be insects and rats. On this generation then rests the responsibility of saying what forms of life shall be preserved, in what localities, and on what terms. Let us not delude ourselves for a moment by believing that primitive hunting conditions can ever be restored. The bison and the sheep, the antelope and the wapiti, as game animals have already disappeared or are doomed. So far as wild hunting is concerned, the best that can be hoped for are the highly artificial conditions which prevail on the continent of Europe to-day, and these are not attractive to anyone who has known the free life of the true woodsman. Let us not suppose for a moment that our present game laws, or any improvement or modification of them, can ever permanently provide hunting in the face of the commercial necessities of the future, but let us rather bend our energies to selecting certain portions of our national domain, and establish and strictly maintain sanctuaries for some portion of the wild things that have come down to us from the past.

THE ZOOLOGICAL SOCIETY'S WORK FOR WILD LIFE.

By HENRY FAIRFIELD OSBORN.

THE grand object to which the Zoological Society has chiefly devoted itself during the past ten years, namely a great Zoological Park, depends for the future on the preservation of wild animal life, because, without renewals from the wilderness, our collections will gradually die out and disappear.

In spreading the love of animals we have already made thousands, perhaps millions, of new friends for wild life. Now we propose to unite them all in a great campaign of conservation. This BULLETIN is not our first gun, but it is our

first broad-side.

Our work will be mainly directed to the state and public lands of North America, but we shall also co-operate with the great conservation movement in all parts of the world, through a special committee backed by the sentiment and funds from the Society and our future endowments.

Tree preservation in the United States is pressing, but it is less pressing than animal preservation. Trees can be replanted or preserved from seeds, but an animal once gone is lost to the world forever. Nature has been at work millions of years creating some of these exquisite pieces of mechanism and beauty. There is at least a million years' history back of the prong-horned antelope, which is on the danger line to-day. We find its diminutive forbears existing on the plains of South Dakota, before the Rocky Mountains were completely formed, and when fig-trees and the bread-fruit flourished in Montana.

The Virginia deer has even an older known pedigree, two million years back, perhaps. This long and noble ancestry gives fresh force to the appeal for preservation.

Laws enacted in the very best spirit will not absolutely protect. They will help, but in very many of the outlying districts, where the rare game still seeks a refuge, there is no one to enforce the law, and very little sentiment in its favor. Animals are destroyed not for sport but for meat. In the Hell Creek region of Montana, which a few years ago abounded in pronghorned antelope, mountain sheep and blacktailed deer, the destruction has been entirely for meat, and we must admit it is but natural that it is so. The least defensible form of butchery is the extermination of game in the name of sport. The meat-hunter is solitary, he works throughout the year, he knows his distant neighbors will not inform upon him, and that in any case

he will not be punished. This is the actual situation at the very few remaining frontier points, and this is why this Society, while backing up legislation, proposes to put the main brunt of its fight on

ANIMAL REFUGES.

Every territory and every state should have animal refuges for the different kinds of wild life remaining within its borders; and these refuges will soon become the absolute guarantee of the survival of animals like the beautiful prong-horned antelope, which is now on the verge of extinction, and almost certainly the next animal to disappear unless instant measures are taken.

There are two districts in our mind among many others, which are particularly designed by nature as refuges. One is the Hell Creek region itself, untillable, uninhabitable, a chaos of cañons, supporting only a few head of cattle, and that at great risk during every severe season. This is an ideal home for mountain sheep and black-tailed deer, and even for buffalo and

prong-horned antelope.

Another preserve region we have visited, is on the head-waters of the Niobrara River or Running Water, in western Nebraska, on the ranch lands of James H. Cook, one of the western pioneers, who is willing and ready to devote his lands and his life to the noble work of conservation. This is an ideal home for the pronghorn and the buffalo, with water, shelter and grass. Prairie, plains and bottomlands combine in the same region—which is also one of the great historic crossing grounds of the migrations of buffalo before the northern and southern herds were divided.

These are two practical examples of the possibilities of the game refuge plan, which our committee will take into consideration. Like all great movements, the first step is the creation of a strong and earnest sentiment, and the establishment of a sound and practical policy. To this sentiment the present Bulletin is chiefly devoted, and to the exposition of what has and what has not been done.

THE CASE OF DAVID'S DEER.

BUT for the enterprise of His Grace the Duke of Bedford, Pére David's Deer, formerly of Manchuria, would now be as extinct as the dodo. The Boxer war destroyed the last known specimens that lived in China, and all those living ten years ago in the zoological gardens of Europe are now dead.

David's Deer is a large and handsome animal, with a long tail, and queer-shaped antlers of

good size. It owes its name to the fact that it was first brought to the attention of zoologists by Father David, a Catholic missionary, in China. Of this species there are living to-day precisely twenty-eight individuals; and all of them are in the matchless collection of hoofed animals owned and maintained by the Duke of Bedford, at Woburn Abbey, England, thirty miles northwest of London. That collection is strictly private, and is to be seen by no one save on the invitation of its owner, and by his cooperation.

Zoologically, as well as otherwise, it is risky and dangerous to preserve in one basket the whole of a lot of particularly valuable eggs. In no form of close captivity could David's Deer be safer, or more immune from epidemic diseases, than in Woburn Park. But, at the same time, the eggs are all in one basket. If rinderpest should break out in England, if the footand-mouth disease, or the "game disease," or tuberculosis should enter Woburn Park (which Heaven forbid!) it might go hard with David's Deer. If Germany should invade England—as so many staid Englishmen fear she might or could do.—the herd of David's Deer at Woburn Park might easily be butchered to make a soldier's holiday, as was the herd of 200 in the Imperial Park south of Pekin.

We have respectfully suggested to the Duke of Bedford that it would be a wise and generous act if he were to place an adult male and two females from his herd of David's Deer in some great wilderness preserve, we care not where it might be, to become as wild and mayhap as fruitful as the three English red deer that so wonderously stocked Waipura Island in New Zealand, and without any deterioration through in-breeding. Three animals located in the right spot, under intelligent and skilful management in the beginning, might easily rehabilitate the species in a wild state, and restore it to the world's fauna.

Of course no one can say in a moment just where such an effort might best be made. It is certain, however, that four elements are necessary of success: A climate that is not too severe; abundant food and water; a variety of cover, on hills, valleys and plains and probably swampy ground; absolute protection from predatory animals, and from dangerous men, generally.

It is possible that all these conditions could be found in some of the deer forests of Scotland; but it is doubtful whether in all Scotland one could be found in which the David's Deer would not be in great danger of being shot by mistake. I think such an effort should be put forth only in a fenced preserve, of large size, in which no shooting is ever allowed. The Montana National Bison Range, or the Wichita Bison Range, might answer well; though the climate of the former might prove too rigorous for animals that have been reared in captivity in the milder climate of England. The logical conclusion is the Wichita National Bison Range containing twelve square miles of as fine deer country as any deer ever saw.

LEND A HAND TO GLACIER PARK.

In N the wild and picturesque mountains of northwestern Montana, there is a region that is splendidly provided with rugged peaks, deep valleys, coniferous forests, glistening glaciers, mirror lakes and mountain streams. It is of no direct commercial value to man. The most persistent miners and prospectors have given it up as worthless to them, and it contains no agricultural lands worthy of mention. By reason of the depth of its winter snows, it is wholly unsuitable for grazing purposes.

Indirectly, however, the very snows and streams that now render that region impassable in winter and early spring constitute an asset of real value to the people of this country who live below it. To preserve that value to the utmost, and devote it to the greatest good of the greatest number, there is now before Congress a bill to convert 1300 square miles of that mountain region into a forest reserve to be called Glacier National Park.

The area selected contains sixty glaciers and 250 lakes, and as a source of water supply it is surpassingly fine. Cut off the forests, however, and that region will be a constant menace, and a source of disastrous floods below. Of the desirability of preserving those forests, there can be no question. But how about the game? Senator Carter's bill, which died in the House last winter, did not provide for the wild creatures, probably because he fears that to have it do so would provoke opposition to the bill as a whole. Even the best game-protectors must carefully consider ways and means.

The proposed park contains a fair number of mountain goats and mountain sheep, four members of the deer family—moose, elk, mule-deer and white-tail,—and a few black and grizzly bears. There are six species of grouse, many other birds of exceptional interest, and an abundance of trout of three species.

During the past five months, the columns of Forest and Stream have contained three illustrated articles on Glacier Park in which its features and its contents have been set forth with

admirable fullness of detail. The dates of the issues are January 9 and 23, February 20.

We are troubled by the fact that Senator Carter's last bill did not propose to make of Glacier Park a wild-life preserve! Evidently the Senator felt that with that feature included, his bill might be defeated. But will it? Let us see.

In 1900 the Lacey bill, for the better protection of birds, became a law, by an overwhelming majority,—chiefly because a large number of good citizens wrote to their members of Congress and demanded the passage of that bill without any further postponements or delays. As soon as the members of Congress were definitely assured that "their people" desired the Lacey Bird Law, it went through on a whirlwind of votes.

Now, then, if the people of the United States desire that Glacier Park be made, and also made as an absolute game preserve, the way in which they can secure that end is by saying so to their members of Congress, next December, when the bill will start anew!

We believe that the making of the Glacier Park forest and game preserve would be directly in the interest of all the people of the United States; and not only those of to-day, but the generations of the future. There is nothing to be gained by postponing the effort in behalf of the wild life of Glacier Park. If there must be a campaign to secure its protection, by all means lets have it now, and make one job of it! The wild life of that region, game and all, must be preserved; and that is all there is in the way of a question about it.

We call upon you, and your newspaper if you have one, to consider this matter, and decide whether or not you, as a broad-minded, patriotic, far-seeing citizen, have a Duty in the matter. If you decide that you have, then write to your Congressman next December, and state your views and your wishes. On all such matters, you will find that the men who compose our Congress and our state legislatures are willing to enact into law anything reasonable that the people desire in the line of permanent conservation of our natural resources.

We have no right, either legal or moral, to destroy the wild life now on this earth, or to permit it to be destroyed. We are its guardians and trustees; and the men of the future will hold us accountable for the manner in which we guard their inheritance, and transmit it to them.

BULLETIN. ZOOLOGICAL SOCIETY

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Permission is given to quote in print any of the matter contained in this issue, with the usual credit to the Zoological Society Bulletin. Editors are reminded that every article that appears in print in behalf of wild-life protection directly aids the general cause.

WILD-LIFE PROTECTION.

This number of the Bulletin is wholly devoted to the cause of wild-life protection, because the duties of the hour demand it. One of the three great objects for which this Zoological Society was founded is "the preservation of our native animals." In this field, we began active work in 1897, the second year of our existence. Notwithstanding the great labor that has been involved in the creation of the Zoological Park. -and its practical completion in eleven years,the Society has constantly engaged in work designed to protect and perpetuate "our native animals." Altogether we have expended about \$6,000 in this line of work.

But the situation has constantly grown more acute, and to-day the need for men to enforce existing game laws is greater than ever before. The Zoological Society is in great need of funds with which to put men in the field, and keep them there actively and aggressively at work. This need emphasizes once more the necessity of raising immediately a permanent endowment fund, from the income of which we can pay the cost of wild-life protection work. If some one would place in our hands such a fund as that left by Mr. Wilcox, i. e., \$331,000, for the cause of bird protection, it would go very far toward preserving for future generations of Americans some of the wild species that now are threatened with practical extinction.

THE DUTY OF INSTITUTIONS TO WILD LIFE.

It is an amazing fact that of all the scientific institutions of America two only are actively engaged in the promotion of measures for the preservation and increase of wild life. The exceptions to the rule of absolute passivity are, so far as known, the New York Zoological Society and the American Museum of Natural History.

Of course we speak only to the extent of our knowledge; and if there are other exceptions to be noted, we will welcome them.

The amount of highly specialized "investigation" work that is being done by and through our zoological and educational institutions, is very great; but thus far no man has had the hardihood to speak in print regarding its real and practical value to the world. The amount of abstruce technical scientific publications that annually is turned out in America, is enormous. Our government pays for a quantity of it, and private fortunes meet the bills of the remainder. We do not complain about it; because our withers are unwrung; but the facts are of use here to point a moral.

While all this high-class scientific work has been going on, year after year,—at New York, Washington, Philadelphia, Chicago, Boston, Iowa City and elsewhere,-various bodies of unscientific men and women have been engaged in a constant warfare with wild-life annihilators of a hundred different kinds. Even down to 1896, the scientific ornithologists of America, as a body, had done absolutely nothing in the cause of bird protection; and to-day, also, there are many ornithologists who for years have drawn their annual bread and butter from ornithology, who seem to care nothing about our birds save to write papers and books about their dead remains.

With the passage of the Lacey Bird Law,—chiefly through the efforts of G. O. Shields, John F. Lacey, the Audubon Societies and Theodore S. Palmer,—the United States government entered actively into the very necessary practical business of wild-life protection. To-day, the Biological Survey is a great power for good in this direction; and the quicker the game-protection department of it is provided by Congress with more money, the better for us all.

It is quite time that the sportsmen of America should have substantial and continuous help in the warfare they are waging in behalf of wild life. It is time for all the institutions of this country that are in any way interested in zoology to wake up, and take an active part in the warfare that is going on! The amount of accumulated zoological knowledge is now so great that we need fear no fact famine in the near future, not even if every zoologist in America should enlist for ten years of active campaigning in behalf of wild life. If the National Museum, the Smithsonian, the Philadelphia Academy of Sciences, the New York Academy, the Carnegie Institutions of Washington and Pittsburgh, the Museum of Comparative Zoology, the Boston Society of Natural History, the Field Museum and the Chicago Academy of Sciences, were to actively engage in wild-life protection for say, ten years, can anyone doubt the enormous practical benefit that would result?

There are certain duties which civilized men and women can not evade, and be respectable. For zoologists to ignore the slaughter of wild life is wholly wrong; and when we say only that, we put the case very mildly. It is the bounden duty of the broad-minded and humane men of to-day to take active measures toward securing, for the men of the future, a fair inheritance of the marvellous wild life that still exists on this continent, but which an army of annihilators is trying hard to destroy.

It is a most singular fact that the true protection of wild life are now, and always have been, the sportsmen and hunters who theoretically should be destroyers, instead of preservers; and it is perhaps more singular still, that those whose whole life's work is devoted to the study of animals are so callous and indifferent to its perpetuation.

Let no closet naturalist believe for one moment that there is no work for him to do, individually. In one hour's time one practical worker in this field can lay out tasks that would keep an army of men busy for a year. Men and money are needed, and the whole North American continent is the battle-ground. The present is no time for timid, half-way measures.

Each institution of those named above should put into the field at least one active and efficient worker, keep him there, and pay the cost of his campaign work. To do any less than this is to fail in a solemn duty.

SUCCESS OF THE BISON SUBSCRIPTION FUND.

Immediately following the passage by Congress in May, 1908, of the bill appropriating \$40,000 for the lands and fencing of the proposed Montana National Bison Range, the president of the Bison Society (W. T. Hornaday), set out to raise \$10,000 by subscription. That fund was necessary to enable the Society to fulfil its pledge to the government that it would furnish the nucleus herd as a gift, as soon as the range was ready to receive it.

It was decided that the subscription should be national in scope; and accordingly the people of every state and territory were invited to participate, in sums from one dollar upward. The call was sent to 150 mayors of cities and fortyeight boards of trade,—but without securing even one dollar through any one of them!

In view of the fact that the New York Zoological Society already had presented a herd of bison to the national government, the members of that Society were not called upon to subscribe, save through the membership of a few in other organizations. At the same time, three members of the N. Y. Z. S. generously helped to close the canvass with large subscriptions, to the great relief of the chief canvasser. Mr. Charles E. Senff gave \$1,000, Mr. William P. Clyde \$500, and Mr. Andrew Carnegie \$250.

The campaign for the bison fund lasted nine long months, but finally closed in February, 1909, with a total of \$10,560.50. It contained a number of surprises; chief of which were the following:

The West,—with but slight exceptions,—was remarkably unresponsive, and makes a pitiable showing in the total. The East has cheerfully borne 80 per cent. of the burden.

The women of America subscribed more than one-tenth of the entire sum; and a lady of Massachusetts (Mrs. Ezra R. Thayer, of Boston), raised one-twentieth of the whole fund!

The funds now in hand are sufficient to purchase forty-two purc-blood bison, and deliver them upon the range. The government is now acquiring and fencing the twenty-eight square miles of range that were selected by the Bison Society, and it is hoped that the fence will be completed in time that the nucleus herd can be delivered next October.

The Bison Society has been greatly benefitted by the terminal facilities afforded its president in the New York Zoological Park, and desires to record here an expression of its gratitude.

A showing of the entire bison subscription, by

states, is as follows:

SUMMARY OF SUBSCRIPTIONS.

New York	
Massachusetts	2,320,00
Minnesota	1,054.00
Pennsylvania	503.00
Montana	366.00
Illinois	177.50
District of Columbia	149.00
Connecticut	97.00
New Jersey	
California	
Michigan	
Ohio	
Missouri	
New Hampshire	
Oklahoma	48.00
Rhode Island	
Nebraska	
England	
Colorado	
Arizona	
Florida	
Maryland	
Washington	
France	
Iowa	
Wyoming Kentucky	5.00
Kentucky	4.50
Maine	
West Virginia	4.00
"Anonymous"	3.00
South Carolina	
Louisiana	
Vermont	
British Columbia	1.00
Total	\$10,560.50

EX-PRESIDENT ROOSEVELT'S RECORD IN WILD-LIFE PRESERVATION.

A MONG other things left behind him of which he and his friends may well be proud, ex-President Roosevelt has gone out of office with a most enviable record as a promoter of measures for the protection of wild life. Of course those who knew him best expected much of him, but it is safe to say that even the most hopeful anticipations have been surpassed.

In one short article it is quite impossible to enumerate more than a very few of the measures that should be named in this connection. It is safe to say that during the whole of his six years as president, no measure calculated to benefit the wild life of North America ever was put before him without receiving his instant sympathy and consistent support. He never ignorantly and parsimoniously killed an act for the perpetuation of the bison, nor left the gray squirrel a

prey to gunners because it was too much trouble to sign the bill that had been passed in its behalf,—as did an executive officer of a most important state.

Even the briefest enumeration of the wildlife measures favored and promoted by ex-President Roosevelt must include the following:

The Alaska game laws of 1902 and 1907.

The establishment of the Wichita Game Refuge, Oklahoma, in 1902, and the acceptance of the bison herd in 1907.

The establishment of the Yellowstone Park

bison herd in 1902.

The increased attention given the big game in the Yellowstone Park, including the vigorous prosecution of poachers in 1907-08.

The creation of the Grand Cañon game

refuge, in Arizona, 1906.

The order prohibiting hunting or trapping of game on the Fort Niobrara Military Reservation, Nebraska, 1908.

The passage of the bill providing for the Montana National Bison Range in 1908, and two supplementary measures in 1909.

The creation of 53 Federal Bird Refuges,

1903-1907.

The creation of the Mt. Olympus National Monument, Washington, 1909.

The creation of the Superior National Forest and Game Preserve, Minnesota, 1909.

The meting of the North American Conservation Commission, and its declaration for game protection, 1909.

Is not this record sufficient of itself to make a reign illustrious? We think it is.

SOME OF THE IMPORTANT THINGS TO BE DONE FOR THE PROTECTION OF WILD LIFE.

ONDEMN as unsportsmanlike and unfair the use of the noiseless gun in killing wild life.

Establish Glacier National Park, as a forest and game preserve.

Establish the Appalachian National Forest Preserve,—saying nothing at present about the game!

Work for the enactment of a perpetual close season on all the antelope, caribou, mountain sheep and mountain goats in the United States, wherever situated.

Encourage Colorado in the creation of a State Game Preserve in Estes Park.

Discourage the use of wild game as necessary food for civilized man.

Discourage the killing of shore birds (Order Limicola) as "game," and "food" for man.

Discourage the indiscriminate carrying of firearms.

Prohibit in all states and territories the carrying of guns by unnaturalized aliens.

Prohibit, in all states and territories, all Spring shooting; and begin the campaign in Iowa.

Acquire Cat Island, Gulf of Mexico (near Pass Christian, Miss.) as a bird preserve.

Provide for every state and territory a gun license law.

THE RIGHTS OF OWNERS OF ANIMAL PRESERVES.

WE believe that every owner of a private game preserve is entitled to the right to kill the game that he owns and maintains, whenever he pleases, provided such killings do not interfere with the execution of laws for the protection of game and other wild life outside of private preserves. We believe that this is not only good law, but also good common sense.

If an owner of a private menagerie of show animals has a right to kill a bad deer during the close season,—which he undoubtedly has,—it is only logical to conclude that the owner of a deer pasture should have the same right. The owner of a game park may kill his dog—if that painful duty seems imperative—but according to the present laws of many states, he has no right to kill one of his own deer, save in the open season for deer.

This situation is absurd, and therefore can not long endure. The raising of deer or pheasants or mallard ducks in fenced enclosures, for the market, should now be placed on the basis of a legitimate industry. There is no good reason why an owner of a deer preserve should not kill one of his deer whenever he chooses, provided he does not sell the carcass, or give it away outside his preserve, during the close season; but the sale of the flesh in the close season is a different and far more serious matter.

A sensible law covering this point would give much encouragement to the breeding of deer and game birds, and to the establishment of more private game preserves. There are many good reasons for the creation of a new basis for this industry, provided it can be accomplished without promoting the illegal killing of wild stock. It is there that the shoe pinches hard.

There is one grave difficulty that must be overcome before it becomes possible to legalize either the killing or the selling of home-grown game during the close season. It is well known

that every unscrupulous game dealer will be quick to take advantage of any relaxation of existing laws to traffic illegally in wild game illegally killed. The only objection to the passage of laws that will be fair and liberal for the preserve owners lies in the overshadowing menace of the game-dealer and lawless consumer.

If any man can propose a system that will permit the preserve owner to kill and market surplus pheasants or deer during the close season, without having the privilege immediately and successfully used as a cloak for the illegal slaughter of wild game, let him bring it forth in his state legislature.

REFUGES FOR BIRDS.

AROUND the coast of the United States, there is gradually being extended a chain of insular bird sanctuaries that means much to the avifauna of North America. Prior to January 1, 1909, twenty-five national bird refuges had been created by executive order and proclamation, chiefly along our sea-coasts. They provide specially protected breeding-grounds for the brown pelican, gulls, terns, skimmers, shore-birds of various species, herons, egrets, ducks and numerous other species. It is impossible to overestimate the zoological value of these sanctuaries, or to praise too highly the wisdom that brought them into existence.

The accompanying map shows all the littoral bird sanctuaries that were created prior to 1909; but during the present year 26 more island preserves have been proclaimed. The list of the federal bird reservations established previous to 1900 is as follows:—

LIST OF FEDERAL BIRD RESERVATIONS.

Pelican Island, Breton Island, Stump Lake, Huron Island. Siskiwit Island, Passage Key, Indian Key Tern Island. Shell Key, Three-Arch Rocks, Flattery Rocks, Quillayute Needles, East Timbalier Island, Copalis Rock, Mosquito Inlet, Tortugas Keys, Klamath Lake, Key West, Lake Malheur, Chase Lake, Pine Island, Matlacha Pass, Palma Sola. Island Bay. Loch Katrine,

Florida Louisiana, North Dakota, Michigan, Michigan, Florida. Florida. Louisiana. Louisiana, Oregon. Washington, Washington, Louisiana, Washington, Florida, Florida. Ohio. Florida. Ohio. North Dakota, Florida, Florida, Florida. Florida, Wyoming,

March 14, 1903. October 4, 1904. March 9, 1905. October 10, 1905. October 10, 1905. October 10, 1905. February 10, 1906 August 8, 1907. August 17, 1907 October 14, 1907. October 23, 1907. October 23, 1907. December 7, 1907. October 23, 1907. February 24, 1908. April 6, 1908. August 8, 1908. August 8, 1908. August 18, 1908. August 28, 1908. September 15, 1908 September 26, 1908. September 26, 1908. October 23, 1908.

October 26, 1908.

A SPORTSMAN'S PLATFORM.

FIFTEEN CARDINAL PRINCIPLES AFFECTING WILD GAME AND ITS PURSUIT.

Proposed by William T. Hornaday, April 17, 1908.

- 1. The wild animal life of to-day is not ours, to do with as we please. The original stock is given to us in trust, for the benefit both of the present and the future. We must render an accounting of this trust to those who come after us.
- 2. Judging from the rate at which the wild creatures of North America are now being destroyed, fifty years hence there will be no large game left in the United States nor in Canada outside of rigidly protected game preserves. It is therefore the duty of every good citizen to promote the protection of forests and wild life, and the creation of game preserves, while a supply of game remains. Every man who finds pleasure in hunting or fishing should be willing to spend both time and money in active work for the protection of forests, fish and game.
- 3. The sale of game is incompatible with the perpetual preservation of a proper stock of game; therefore it should be prohibited, by laws and by public sentiment.
- 4. In the settled and civilized regions of North America, there is no real necessity for the consumption of wild game as human food; nor is there any good excuse for the sale of game for food purposes. The maintenance of hired laborers on wild game should be prohibited, everywhere, under severe penalties.
- 5. An Indian has no more right to kill wild game, or to subsist upon it all the year round, than any white man in the same locality. The Indian has no inherent or God-given ownership of the game of North America, any more than of its mineral resources; and he should be governed by the same game laws as white men.
- 6. No man can be a good citizen and also be a slaughterer of game or fishes beyond the narrow limits compatible with high-class sportsmanship.
 - 7. A game-butcher or a market-hunter is an undesirable citizen, and should be treated as such.
- 8. The highest purpose which the killing of wild game and game fishes can hereafter be made to serve is in furnishing objects to overworked men for tramping and camping trips in the wilds; and the value of wild game as human food should no longer be regarded as an important factor in its pursuit.
- If rightly conserved, wild game constitutes a valuable asset to any country which possesses it; and it is good statesmanship to protect it.
- 10. An ideal hunting trip consists of a good comrade, fine country, and a $very\ few$ trophics per hunter.
- 11. In an ideal hunting trip, the death of the game is only an incident; and by no means is it really necessary to a successful outing.
- 12. The best hunter is the man who finds the most game, kills the least, and leaves behind him no wounded animals.
- 13. The killing of an animal means the end of its most interesting period. When the country is fine, pursuit is more interesting than possession.
- 14. The killing of a female hoofed animal, save for special preservation, is to be regarded as incompatible with the highest sportsmanship; and it should everywhere be prohibited by stringent laws.
- 15. A particularly fine photograph of a large wild animal in its haunts is entitled to more credit than the dead trophy of a similar animal. An animal that has been photographed never should be killed, unless previously wounded in the chase.

REMARKS ON THE SPORTSMAN'S PLATFORM.

Up to this time it appears that no declaration of principles ever has been submitted to the sportsmen of the world, or even to those of America alone, for their endorsement and adherence. Because of this fact, and in the hope of a result useful to all, I have the honor to submit the enclosed Sportsman's Platform, for such endorsement as it may be able to win on its own merits.

It is my belief that much strength may be gained for the general cause of game protection by a definite agreement between the sportsmen of the world on the cardinal principles that apply everywhere to the pursuit and the preservation of large game. Such an agreement would be received in all law-making bodies with respectful consideration, and if sufficiently comprehensive it might prove of great value in campaigns for better game laws, for the education of the general public, and for the creation of new game preserves.

These fifteen cardinal principles have been drawn up to cover not only the conditions that exist to-day, but also to meet others that seem of certain development in the near future. For the

countries of Asia and Africa it is easy to substitute for "Indian" the word "native."

The adoption of this Platform by sportsmen's organizations, and by unattached sportsmen, is respectfully invited; and a careful register will be kept of all who advise me of their endorsement.

ADOPTIONS.

The following organizations have formally adopted the Sportsman's Platform as their code

of ethics, and published it in their club books:— CAMP-FIRE CLUB OF AMERICA, New York, Dec. 10, 1908. Ernest T. Seton, President. Member-

ship, 260.

The Lewis and Clark Club, Pittsburg, Pa. William M. Kennedy. President. Sixty members. The North American Fish and Game Protective Association, January 20, 1909. Hon. Dr. J. O. Reaume, President. Membership about 400. An international organization. Adopt-

ed at the Toronto Convention, after a full discussion of Plank 5.

The Rod and Gun Club, Sheridan County, Wyoming, May 1, 1909. George Lord, President; Dr. F. A. Hodson, Vice-President. Seventy-four members.

THE CAMP-FIRE CLUB OF MICHIGAN, Detroit, May 20, 1909. Gustavus D. Pope, President. Organized May 12. Twenty members.

CONVICTION OF SONG-BIRD KILLERS.

VINCENZO SACCO and Antonio Guadagno. Who were arrested by Deputy Game-Warden John J. Rose, of the Zoological Park force, for killing song-birds for food, as described in BULLETIN No. 32, page 473, were finally tried and convicted, and sentenced to ten weeks in the penitentiary. If the fines to which the men were liable had been paid, according to law, they would have amounted to about \$450. The offenses referred to were committed in New York City, within three miles of the Zoological Park.

MISS CAROLINE PHELPS STOKES.

THE wild birds of America have lost a good friend. On April 26, 1909, Miss Caroline Phelps Stokes passed from earth.

It is fitting that all friends of birds, and of wild life generally, should know that only a few months before her death, Miss Stokes completed the establishment with the New York Zoological Society of a special endowment fund of \$5,000, the income from which is to be expended annually in measures designed to promote the protection and increase of our native birds. So far

as we are aware, this is the second bequest of the kind ever made in this country, and the Society will scrupulously carry out the wishes of the lamented founder of the fund.

NATIONAL AND PROVINCIAL PARKS AND GAME PRESERVES.

June 1, 1909.

IN THE UNITED STATES.

	Area.	
Yellowstone National Park, Wyoming	2,142,720	acres
Chickamauga and Chattanooga National and		
Military, Tennessee	6,195	6.6
Sequoia, California	160,000	66
Yosemite, California	967,680	6.6
Mt. Rainier, Washington	207,360	6.6
Crater Lake, Oregon	159,360	6.6
Game Cañon Game Preserve	2,019,000	6.6
Mt. Olympus National Monument	600,000	6.6
Superior Game and Forest Preserve	909,743	66
Wichita Forest and Game Preserve	57,120	6.6
Wichita National Bison Range	9,760	6.6
Montana National Bison Range, fenced range,		
for captive game herds	20,000	* *
101 B B		

IN THE CANADIAN ROCKIE	S.	
Rocky Mountains Park, Alberta	2,764,800	acres.
Yoho Park, Alberta	1,799,650	**
Glacier Park, Alberta	1,474,560	6.6
Buffalo Park, Alberta (for captive bison)	384,000	6.6
Elk Island Park, Alberta, (for captive bison)	40,960	61
Jasper Park, Alberta	3,488,000	41
East Kootenay Preserve, British Columbia	288,000	64

East Kootenay Preserve, British Columbia...... ("Goat Mountain Park.") Yalakom Mountains, Lillooet District, British

192,000 **



WILLIAM DUTCHER.

THREE
GREAT CHAMPIONS
OF WILD
LIFE.



GEORGE O. SHIELDS.

THERE are three men who will be remembered gratefully by millions of Americans for a century after the ephemeral celebrities of to-day have been forgotten en masse. It is well that these men should be fully known and appreciated while they are alive.

Dr. Theodore S. Palmer, Assistant Chief of the Biological Survey of the Department of Agriculture, is always to be found where the fight is ficerest. He is an expert on game laws, a shrewd and careful manager, a trained diplomat, and also a resourceful fighter. Whenever state workers get into a fierce campaign, Dr. Palmer is appealed to for aid. He has appeared in the legislatures of perhaps twenty different states, and helped to win many a campaign for wild life.

It was he who relentlessly and tirelessly pursued the infamous Binkley and Purdy gang of poachers in the Yellowstone Park, and with the vigorous backing of the Department of Justice dealt the poachers a crushing blow. The four poachers who once were so bold and defiant were utterly ruined, one being to-day in the penitentiary, and the other three fugitives from justice. This victory was of far-reaching importance.

Besides his active campaigning for good laws, and against bad ones, Dr. Palmer is the Government's expert on the making of reserves for big game, and island refuges for birds. The new Mt. Olympus game and forest reserve in Washington is his latest and most important achievements, and in every sense it is a monument to him, none too great to stand as a perpetual memorial of the man and his work.

Mr. William Dutcher, of New York, President and general manager of the National Audubon Society, deserves all the honor the lovers of birds, and the recipients of their beneficial services, ever could bestow upon one individual. His career began in 1898, as chairman of the A. O. U. Committee on Bird Protection. His special work has been the protection of song-birds, the gulls and terms of the seashore, the "plume birds" and insectivorous birds, generally.

Inspired by Mr. Dutcher's zeal and work, the late Mr. Albert Wilcox bequeathed his entire fortune, of \$331,000, to Mr. Dutcher's National Association, for bird protection work, and in 1906 it became available. The impetus which the income of this fund has given

to systematic work in behalf of birds has been very great. Mr. Dutcher now is enabled to keep constantly in the field five splendid workers, where their services are most needed, and pay all their expenses. Fortunately, Mr. Dutcher's private business is on a basis so thoroughly automatic that he is enabled to devote a great deal of his time to managing campaigns in behalf of birds. The Francis bill recently pending at Albany against "the white badge of cruelty" was his measure, and as usual the alien milliners were solidly arrayed against him, on the plea that his bill would hurt their business!

The farmers of America little realize what they owe to William Dutcher. Perhaps eighty per cent. of them have not yet heard of him; but with them all his name should be a household word.

Mn. George O. Shields' Magazine, founder and for ten years president of the League of American Sportsmen, bears a name that for many years has been a symbol of terror to "game-hogs," and the exterminators of wild life. He did not hesitate to use drastic methods in influencing the men who shoot and fish not wisely but too well, whenever their skins proved impenetrable to appeals to reason and decency. By the game-hog element, Mr. Shields has been both feared and hated; but his influence in behalf of wild life has covered practically the whole United States, and has been of enormous value to that cause. He has played an important part in securing new legislation, but also in enforcing protective laws.

For years this veteran game protector has battled early and late, in season and out, tirelessly, and at times even recklessly, so far as his own fortunes were concerned, to stop the slaughter of wild creatures, and reform the inconsiderate and wanton game killers. The work he did, and still is doing, will live and be remembered by his countrymen long after his active labors are done.

During the past four months Mr. Shields has made a tour across the continent, in which he delivered seventy-four lectures and over 200 addresses to schools, each one of which was a powerful appeal in behalf of wild life. The tour was practically a continuous ovation, and its influence upon the public will be not only great, but continuous.

THE REAL EXTERMINATORS OF BIG GAME.

BEFORE the International Conservation Conference held in Washington, in an address in behalf of wild life, the Directors of the Zoological Park declared in strong terms that the men who live in or near to the haunts of big game are the real exterminators of our finest wild animals. At this moment, a very aggravating case in point is reported from Fremont County, Idaho, on the western side of the Yellowstone Park.

During the awful weather of the past winter, about 500 elk fled to Fremont County, seeking feeding-grounds by which to survive until spring. Practically all of them were slaughtered by the people living there! And this was done, not only in defiance of the dictates of mercy and humanity, but also in defiance of statute law. At the time that slaughter was proceeding, the people of Jackson's Hole (Wyoming), and the state of Wyoming, were spending nearly \$7,000 in the purchase of hay, and in feeding the elk of Jackson's Hole to keep them from starving en masse.

The following from the Boise (Idaho) Statesman, of February 25th, and quoted in Outdoor Life Magazine, is of general interest:—

"E. W. Yoemans has returned from a trip into Fremont County that took him into the Teton Basin country and to the borders of Jackson's Hole.

"The slaughter of elk in that section is something appalling," he said. The snow is deep and the animals are driven down toward the settlements. They are helpless and can be picked off with ease. Farmers, not hunters, are the guilty parties.

"One man told me he knew a farmer who had killed six of the noble animals. He said he would have complained if the man had not been his neighbor. A mail-carrier informed me he saw forty-two elk struggling through the snow in single file. Two of the animals had been severely wounded and were bleeding and staggering. As the animals approach farmhouses they are mowed down. Elk meat, heads and hides are on sale in suspicious quantities.

"The game law prohibits the killing of more than one elk in a season. The conditions in Fremont County have caused the game warden to be severely criticised. It is stated that no trouble would be experienced in securing evidence. So far not an arrest has been made. Mr. Yoe-

mans brought back with him a copy of the Ashton *Enterprise* of February 11th, from which the following is taken:

"Word reached here Wednesday that the day before six elk had been killed at Squirrel. Today a rancher brings word to town that nine elk cows and calves crossed his place this week and before they had proceeded three miles all but one had been killed. Elk meat was also offered for sale in town to-day, Thursday."

A GAME-LAW "ACCIDENT" IN WYOMING.

ERETOFORE, whenever a joker has been found stowed away in a new game-law, it has always operated against some wild game species, contrary to the intentions of the majority. For example, in 1907, a clause slipped through the Montana legislature removing all protection from the beaver; which was quickly noted, and made much of by trappers who gladly would trap and kill the last beaver, if they could.

But this year, the case is reversed. When the Wyoming legislature very laudably passed a law permanently protecting the prong-horned antelope, and it had been duly engrossed and signed by the governor, a legal stowaway was discovered in its midst. To the horror of the elk hunters, it was found that both the elk and mountain sheep had been named as species for which there should be no open season! And this with thousands of otherwise killable elk around the Yellowstone Park! No wonder Jackson's Hole has put on mourning.

The inclusion of the elk was of course unnecessary, and also decidedly unfortunate. With 30,000 elk in Wyoming, there is no need for a perpetual close season; and there is no need to break up the legitimate business of guiding law-abiding elk hunters. In feeding 20,000 starving elk last winter, the people of Jackson's Hole have done well; and this we must not forget.

As for that mountain-sheep clause, however, we rejoice with exceedingly great joy! The sheep of Wyoming, Montana, Idaho and Colorado must have absolute and permanent protection, or they are doomed to quick extinction! It has not come one moment too soon; and the people of Wyoming should hold that law on the sheep just where it is, forever.



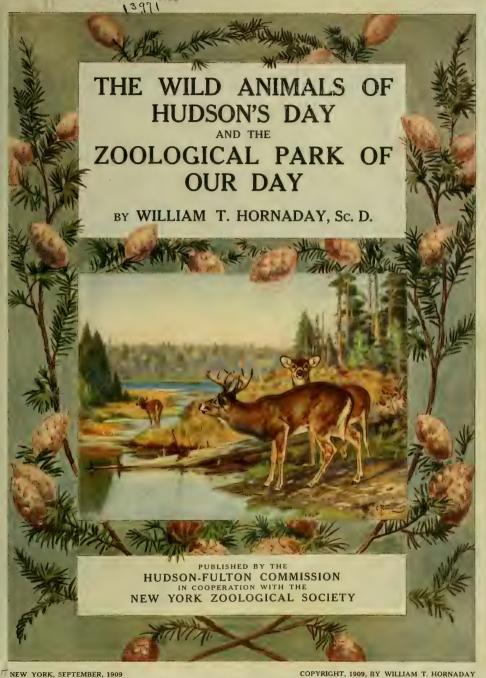
THE WICHITA NATIONAL BISON HERD ON ITS RANGE.



GENERAL VIEW OF THE MONTANA NATIONAL BISON RANGE, FROM THE EAST.

Proposed Buffalo Range from the direction of Mission Mountains. The highest point is Quilseeh, 4,800 feet.

To the left is Wheewheetlchaye-"Red Man's Ridge.



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Appointed by the Governor of the State of New York and the Mayor of the City of New York and chartered by Chapter 325, Laws of the State of New York, 1906

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SPECIAL NOTICE

DURING THE HUDSON-FULTON CELEBRATION the most important species of Mammals, Birds and Reptiles of the ZOOLOGICAL PARK that inhabited New York State in Hudson's day, will be marked by the official flag of the Commission.

THIS SPECIAL BULLETIN appears in the interests of the Celebration. Editors of newspapers hereby are given permission to copy from it, for use in newspapers, any of the matter contained herein save the illustrations that are reproduced by permission of Charles Scribner's Sons, from the "American Natural History."

COPIES OF THIS BULLETIN may be obtained by mail, at 25c, each, postpaid, by remitting to H. R. Mitchell. Chief Clerk, New York Zoological Park. As long as the supply lasts, it will be on sale at the Zoological Park entrances, and elsewhere in New York City.

HUDSON-FULTON CELEBRATION NUMBER

ZOOLOGICAL SOCIETY BULLETIN

Published by the Hudson-Fulton Celebration Commission,

IN COOPERATION WITH

THE NEW YORK ZOOLOGICAL SOCIETY.

September, 1909

THE WILD ANIMALS OF HUDSON'S DAY.

By William T. Hornaday, Director of the New York Zoological Park.

PART I.—THE BIRDS.*

NLY the bold adventurer who has sailed a frail bark westward across three thousand miles of stormy ocean can know the thrill that is transmitted by the heliograph flash of a pair of silvery wings, with the knowledge that land is near. To the westward trans-Atlantic voyager, it is always the Herring Gull that far at sea proclaims the land.

No. 35

On the wing, this Gull is always beautiful; but never is its plumage quite so silvery, and never are its flight-curves so graceful, as when it greets the tired American who thankfully is sailing toward the Statue of Liberty and Home.

Other birds sometimes met off shore, are the deep-water ducks, particularly the Red-Breasted Merganser, with a bill like the serrated snout of a Gangetic crocodile, and flesh so frankly and rankly fishy that only the most powerful human palate can accept it. The Scoters, or Surf Ducks, once in evidence at sea, now are rarely seen in the waters adjacent to New York.

Three hundred years ago, before the dark days of bird slaughter in America, it is reasonably certain that New York Bay attracted immense flocks of web-footed wild-fowl. If the histories of that period do not so record it, then the historians were remiss. We are certain that once inside Sandy Hook, the all-too-succulent Canvasback Duck, and its understudy, the Redhead, "might have been seen," and in fact were seen, by the discerning mariner. But in

an evil moment the baneful eye of the epicure fell upon the savory Canvasback, and he pronounced it the king of table ducks. From that hour, its doom was sealed; and today it is almost a bird of history.

Let us for the moment try to put ourselves in Explorer Hudson's place, and see the birds of the Hudson River and Valley, as he and his men saw them.

Surely on the ponds and streams of Manhattan Island they found the exquisite Wood Duck; for even today an occasional wanderer returns to its old haunts in the Zoological Park! Stated in the form of a proportion, the Wood Duck is to Other Ducks as The Opal is to Other Gems,—the most glorious in colors of them all. The Pintail Duck, however, is more beautiful in form. The most graceful yacht that ever floated never was half so exquisitely modeled in hull and stern and bow as this web-footed water fairy.

The Mallard Duck is like charity. It suffereth long, and is kind; so it holds on long after the more sensitive species have been shot out. It will be our last good wild duck to be exterminated by the pot-hunters for the starving millions of wealth.—for whom the fashionable chef feels that he MUST provide game, or be disgraced. In the years that have flown, the quiet bayous of the eastern shore of the Hudson have fed and sheltered untold thousands of lusty "Green-Heads," young and old, and they were the lawful prey of the hungry explorer and pioneer.

A hundred years ago, the Osprey, or Fish-Hawk, bred numerously on the rocky walls of

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THE HERRING GULL (1, 2) AND COMMON TERN (3, 4).

the Palisades, and then as now paid toll to the Lord of the Air, who also nested there. Even today they are abundant along the Shrewsbury River, south of New York Bay; but the bay itself no longer furnishes good fishing-ground for them.

The Osprey, or Fish-Hawk, is a bird of highly interesting personality. In the first place, it represents a special development for fishing, and in structure it is a sort of connecting link between the Owls and the Falcons. It has legs that are long and muscular, powerful talons, and unusual wing-power. It thinks nothing of dropping a hundred feet straight into ice-cold water, seizing a fish nearly half its own weight. and flying five miles with it. It is doubtful whether any other bird can catch and bear away fish so large in proportion to its own size. I have seen Ospreys flying with fish so largealways carried with the head pointing forward -that the flight of so small a bird with so great a load seemed almost incredible. It is no wonder that a two-pound fish slowly sailing through the air with an Osprey perched upon it offers a temptation so great that an Eagle cannot always resist it; for, like some human beings, the

one thing that an Eagle cannot resist is temptation.

The nesting habits of the Osprey are extremely interesting. When not disturbed, the bird uses the same nest, year after year, but each year adds substantially to the structure. The sticks used are large, and the nest soon reaches a breadth and height out of all proportion to the size of the builder. On Gardiner's Island, at the eastern end of Long Island, the protection afforded the Ospreys nesting there soon rendered the birds so tame and trustful that they nested very low down, and finally upon the ground. Some of the continuous-performance nests constructed on that island are of enormous proportions.

Attempts have been made to colonize Ospreys in the New York Zoological Park, but the birds always flew away and failed to return.

The White-Headed Eagle, or Bald Eagle, still inhabits the Palisades, and may be seen soaring high above the valley of the Hudson.

When you observe a very large dark-colored bird of prey traveling far aloft, with slow and stately sweep of wings that are broad and short and non-vulturine, it is fair to call it an Eagle. If the head and tail have a gleam like frosted



THE CANVAS-BACK DUCK.

silver, then may you know of a verity that the aerial voyager is our national bird in adult plumage. Incidentally, you may also know that it is one of the handsomest of all living birds of prev.

It is now fashionable for young ornithologists to deride our national bird, and besmirch his character, because he exacts tribute of his vassal, the Osprey. But he needs no defense from me, any more than the fires of Vesuvius need a janitor to hold an umbrella over them to keep out the summer rain. Whenever the great American Eagle really needs defenders, three million lusty Americans will rush to volunteer for the campaign.

I think it is true of every continent that the first birds seen by its explorers,—who almost invariably make their initial entries by the water routes.—are the web-footed birds of sea and

shore, and the feathered fishers of the riverbanks and lakes. We can safely predicate that when Hudson first went ashore from the bosom of his mighty river, he became personally acquainted with the Belted Kingfisher, -he of the stem-winding voice, the white collar, and the jaunty cap of blue. It has been gravely stated in print that "Kingfishers are found near streams," and in similar environments may be seen the slow rise and stately flight of the Great Blue Heron; but it is on the marshes that we hear the deep-seated "voice" of the The traditional "boom" American Bittern. of the Bittern looks good on paper; but when it is compared with the real booms of life, it seems very small. Being most happily unfit for food and uncursed with desirable "plumes," the Heron and the Bittern, even though large, still are in our midst; but now there are for-



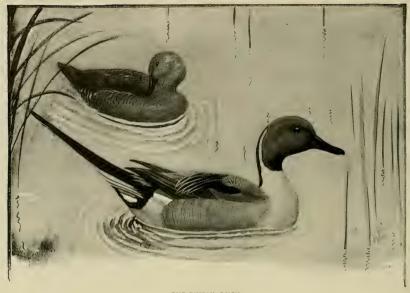
WOOD DUCK.
Male and Female.

eign bird-killers to reckon with, who kill and eat everything wild, from vireos to vultures.

Even yet in spring and fall the weird cry of the uncanny Loon, or Great Northern Diver, is heard occasionally over the upper waters of the Hudson River. In the early days, this bird was a frequent visitor to the Hudson valley, and often nested along the upper waters of the river. Both in form and in habits the Loon is the most remarkable and picturesque feathered inhabitant of the Empire State. It is so much like the giant Penguins of the antarctic regions that it seems as if it once had lived there, but having



THE REDHEAD DUCK.



THE PINTAIL DUCK.

wings for flight had wisely transplanted itself to God's country.

Fortunately for the Great Blue Heron,by millions of people miscalled the Blue "Crane,"-the cruel and insatiate goddess of Fashion has not yet decreed that Woman, the merciful and compassionate, shall collect its plumes for her personal adornment. The welldefined fishy flavor of the Heron's flesh protects it from the evil eye of the epicure; and therefore do we still possess this odd and picturesque bird. True, there is today but one Great Blue Heron where a hundred years ago there were a hundred; but we are thankful that the ruthless savages of civilization have spared us even a few samples of the original stock. And yet, there are today State Game Commissioners who are being importuned to "kill off the Blue Herons." -because in a whole summer season half a dozen of them will kill and eat as many fish as one greedy fisherman would catch and send to market in two days!

If there is anything in game-protection that is supremely annoying, it is solemn talk about the "great destruction of fish" by herons, kingfishers, ospreys, and Californian sea-lions. In many of the coves and alcoves of the low, wet lands flanking the mighty Hudson stream, the Woodcock and the Wilson Snipe still are found; but they are now so rare throughout the Hudson valley that few gunners find it worth while to hunt them. It is the same old story,—of inordinate and persistent destruction, down to the vanishing point. Throughout New York state, and many other states, also, both these species should be accorded absolute all-the-year-round protection for at least ten years. It is either that or extinction; and which will the people choose?

Thanks to the splendid efforts of the bird lovers of New York state, headed by the Audubon Society and William Dutcher, the song birds are in far better case than the game birds and water-fowl. I believe that none of the eastern New York song-bird species of Hudson's day have become extinct, nor anywhere near it. Every spring and summer the sweet wild-wood melody of the Wood Thrush rings day after day through the leafy aisles of the Zoological Park, and like the flash of a fiery feathered meteor, the Scarlet Tanager streaks through the woods and across our lawns, close before



THE BALD EAGLE.



AMERICAN OSPREY.



AMERICAN BITTERN.

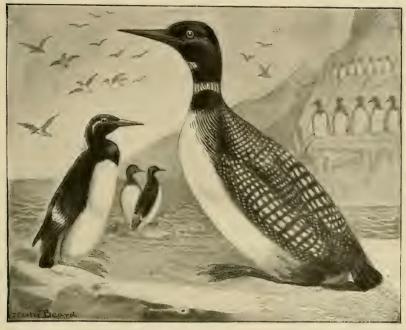
our startled eves. Our dear old friend the Robin, than whom we love none better, joyously accepts our protection, and nests within easy reach of our hands. And only this very spring, even while our men were working in an elephant yard, completing the paving, a Robin built its nest on the frame of the big steel gate of the elephants' fence, that swung within close proximity to an active steam roller and a dozen busy men! And this while the gate daily swung to and fro. Our men were all very proud of this vote of confidence, but alas! the work had to go on. Just as we feared, the bird found the position untenable, and finally it flew away and built another nest in a less busy spot. Another Robin, with more wisdom, built her nest on one of the corral gates of the Antelope House, and although the gate is opened widely every day for the cart to pass through, she successfully reared her brood.



THE BELTED KINGFISHER.

The Bluebird still comes to us abundantly in spring, and in the cat-tail marshes along the Hudson and elsewhere,

"The Red-Wing pipes his o-ka-lee!" just as it has for a hundred years, and we know not how many more. And be it remarked here that amid at least a hundred species of songbirds now kept in the Zoological Park, indoors and out, the Red-Winged Blackbird is the most persistent singer, the most theatrical, and in my opinion very nearly the sweetest singer of them all. In our big outdoor cages, wherein the flocks scarcely know that they are confined, they sing more joyously and persistently than I ever heard them in their own cat-tail marshes.



COMMON MURRE.

THE LOON.

The Rose-Breasted Grosbeak is not abundant in eastern New York, and although his champions claim that he is a bonnie singer, they can not prove it by the bird himself. But to the eye he is fine, even though he is "no great hand at the pipes."

The Baltimore Oriole, dean of the faculty of feathered architects, is much too rare; for a thousand times the number that now visit our village streets and woods would be none too many. His swinging nest, preferably hanging from a down-drooping terminal twig of an elm, is one of the most wonderful manifestations of bird-wisdom and architectural skill that America produces.

Although practically all Americans have now been educated entirely beyond the killing of song-birds,—the most valuable friends of every farmer and fruit grower,—there is danger in the air. From southern Europe there have come to this country, for revenue only, hundreds of thousards of Italian laborers by whom every song-bird is regarded as legitimate prey for the pot! Every camp or large settlement of Italian labor-

crs is a center of song-bird destruction. Look out for them! Curb them! The laws are entirely adequate; please see to it that they are enforced. By the laws of the state of New York, no unnaturalized alien may carry firearms; and the penalties for doing so are very severe. Even in New York city, the Zoological Society has had to put forth a great effort to stop the wholesale killing of song-birds, by Italians, within two miles of our Park!

We greatly regret the fact that throughout the North generally, the pestiferous English Sparrow has to a great extent driven out the House Wren and the Martin. Both those species loved the haunts and companionship of man, until the coming of Ahab, the sparrow. If the latter could be exterminated, the other two species would immediately return.

Of all the feathered foresters that specially look after the insects that damage forest trees, the most showy and picturesque are the Golden-Winged and Red-Headed Woodpeckers. Peor indeed is the forest or wood lot that has not at least one of them. The former is



GREAT BLUE HERON.

gloriously abundant throughout the valley of the Hudson, but the latter is at most seasons quite rare. In my boyhood days I despised the abundance of the Red-Head, and foolishly spurned it; but the cash value of the woodpeckers generally is now understood in a way that it was not forty years ago.

The owls that hooted in the woods of Manhattan Island three hundred years ago still maintain their lines of descent. In spite of guns, traps and poison, the Great Horned Owl, the Barred and the Screech Owl will not down.

All three persist today, even in the Borough of the Bronx. Only four years ago I was one night assaulted in Mosholu Parkway by a Screech Owl who rashly leaped to the conclusion that I was an ornithologist, and therefore dangerous both to her brood and her nest. Half a dozen times she dashed by on angry wing, so close to my face that I feared for my eyes. And it was only last spring that a Barred Owl came to grief in the Zoological Park, in this wise:

On three successive mornings, the men of the Bird House found that during the night something with savage beak and claws had caught several song birds in the outside cages, through the wire netting, killed them, and partly devoured them. Swearing vengeance, the keepers cunningly laid a trap on the roof of the cages, consisting of a dead bird neatly surrounded with an environment of limed sticks, like a score of lead pencils. In the cold, gray dawn of the morning after, the avengers found, helplessly flopping around on

the cage roof, the Barred Owl bird-murderer, with limed sticks all over him, wondering what had happened to him, and why he was quite unable to fly.

Not for long was he left in doubt; for the keepers of song-birds believe in the survival of the fittest.

Throughout the Hudson valley, but not counting the Adirondacks, the ground game-



AMERICAN WOODCOCK.



WILSON'S SNIPE.



ROBIN.



BLUEBIRD.



RED-WINGED BLACKBIRD.



LOGGERHEAD SHRIKE.



ROSE-BREASTED GROSBEAK.

birds are to be reckoned with the things that have been, rather than the things that are. While it is true that the Ruffed Grouse and the Bob White are not by any means extinct in eastern New York, so very few remain they are hardly to be taken into account. Elsewhere in New York state, there are localities in which the shooter may find some of these birds to shoot; but here he can only "hunt" for them, and sagely wonder why they exist no more. It is high time to enact a ten-years close season for both the species named above.

The breeding of wild birds in captivity is now attracting much attention, and the propagation of gallinaceous game birds in preserves, as a legitimate industry, is directly in line with the preservation of our small remnant of Bob-White, Ruffed Grouse and Pinnated Grouse.

There are two habitants of the Hudson Valley that we could lose only with keen regret, but both are gradually fading away. The nocturnal Whippoorwill is known by his picturesque and far-reaching twilight song,—or whistle,—for the call surely belongs in the whistle class, and it is easily imitated by any good whistler.

When the mantle of night has fallen over the few country places that remain in the East, and the busy world is still, those who dwell in summer near quiet woods often hear a loud, clear and altogether melodious whistle from somewhere near the barn. As plainly as print it says, with sharp emphasis, "Whip-poor-Will;" and repeats it many times. Before each regular call there is a faint "chuck," or catching of the breath, strong emphasis on the "whip," and at the end a clear, piercing whistle that is positively thrilling.

Sometimes the bird will perch within thirty feet of your tent-door, and whistle at the rate of forty whippoorwills to the minute. Its call awakens sentimental reflections, and upon most persons exercises a soothing influence. It has been celebrated in several beautiful poems and songs.

This bird,—like the next species to be mentioned,—is strictly insectivorous in its food habits, and renders excellent service to man. In perching it chooses a large and nearly longitudinal limb, on which it sits lengthwise, in close imitation of a bark-covered knot.

The Night-"Hawk," is closely related to the preceding species, but is very far removed from the real hawks. The Whippoorwill is known by being heard, through darkness, but the Night-Hawk strongly appeals to the eye. When the western sun is far down, and the evening air is still, watch for a dark-colored bird with long and sharp-pointed wings gracefully cleaving the air three hundred feet above the earth. If it has a large white spot under each wing, and is busy catching insects in mid-air, of a surety the bird is a Night-Hawk.

But for one thing, we could wish that we could have been the official naturalist of the "Half-Moon," and seen all the birds that Hudson saw; and that is,—we would much rather be alive today. Thanks to many factors, the Hudson valley has not yet been seriously denuded of its forests; but for all that, the status of wild bird-life within it has greatly changed for the worse. The waterfowl and the gallinaceous game-birds have been almost annihilated; and of the herons, egrets, plovers, sandpipers, and large bird forms of every kind, it is probable that less than one one-hundredth now remain.

To a great extent, this is the inevitable result of the settlement of a virgin wilderness by a seething mass of predatory, bird-killing, wild-life-destroying human population; but at the same time the cultivated fields and fruit trees have brought a population of insectivorous birds probably much greater than that which existed here in the days of the forest primeval.

Of the birds that were abundant four hundred years ago, the Great Auk, Labrador Duck and Passenger Pigeon are now totally extinct. The Trumpeter Swan, Carolina Parakeet, Whooping Crane and Heath Hen are on the verge of extinction, and very soon will join the Great Auk and the Dodo. In exchange for the North American species that are wholly or nearly gone, we have acquired—what? Ahab, the English Sparrow, and the Starling,—no more.

Today the lovers of wild life are engaged in a hand-to-hand struggle with the grand army of annihilators, to save at least a respectable remnant of our wild life and forests for the millions of Americans who come after us. It will be well for us if we so discharge our obligations that posterity will not have cause to heap curses upon us for our improvidence, and for our dereliction in the duties of good citizenship.



BALTIMORE ORIOLE AND NEST.



HOUSE-WREN.



PURPLE MARTIN.



SCARLET TANAGER.



GOLDEN-WINGED WOODPECKER.



RED-HEADED WOODPECKER.



SCREECH-OWL.



Copyright, 1902, by W. L. UNDERWOOD. BARRED OWLS.



GREAT HORNED OWL.
With "horns" laid back in anger.



EASTERN RUFFED GROUSE.

The finest gallinaceous game bird of the northeastern United States. Still fairly abundant in the Adirondacks, and the wilder portions of the Catskill region. It is much in need of a ten-year period of absolute protection.

THE IRREPRESSIBLE CONFLICT.

The warfare for the protection of wild life should be just as constant and unremitting as is the manufacture of cartridges. If anyone who reads the literature of the wild-life protectionists is impressed by the repetition of the arguments and exhortations set forth, let him remember that the men who make guns and cartridges work constantly, and know no such thing as weariness. A competent authority has estimated that in the United States there are sold each year about 500,000 shot-guns and 7,000,000 loaded cartridges!

More than this, every year sees new and more deadly guns invented and placed upon the market, for the more rapid and effective slaughter of wild creatures. The great desire of the gunmaker is to give the game absolutely no chance to escape. To-day the perfection of long-range sporting rifles is so great it is difficult to find a man or twelve-year-old boy so unskillful that he cannot go out into the haunts of big game and kill a good "bag." Several American women have killed huge elephants in Africa, and many a boy in his early teens has killed his moose in Maine, Canada or New Brunswick,—all through the deadly perfection of modern repeating rifles.



BOB-WHITE.



CAT-BIRD.

HOW TO BRING BACK THE BIRDS.

In the restoration of depleted wild life, Nature is kind and long-suffering. Up to a certain point, man's destructiveness is forgiven, and the damage is repaired. But the slaughter must not go too far, or the damage will be beyond repair.

One of the most remarkable of the mental traits of wild creatures is the marvelous quickness with which they become aware of the fact that they are protected, and that within certain boundaries their lives are secure. When protection is declared they forgive and forget the slaughterings of the past, and begin life anew. When peace has been established, even the wildest and wariest birds, such as wild ducks that have been long harried by gunners, learn of it in an incredibly short time.

In the Dakotas, during the close season the wild ducks live near the haunts of man in a way that the killing season quickly renders fatal.

To country dwellers, many ways are open whereby they can increase the volume of bird life. Let us enumerate a few of them:

Every farm and wood lot should be posted by the owner or occupant, sternly forbidding all shooting and trapping thereon.

Every country dweller should see to it, by force of arms if necessary, that throughout his sphere of influence the laws protecting wild life are strictly enforced.

Certain wild birds should be fed, especially in winter. For the Bob-White and Grouse, put out corn and wheat screenings. For the Woodpeckers, Nuthatches, Chickadees and others of the hardy "winter residents," nail to the treetrunks many strips of fat pork and chunks of suct. The services that those birds render your

trees are well worth the cost of fifty pounds of pork.

The Ducks, Snipe and Woodcock need only wet ground, water and protection.

To encourage Wrens, put up nest-boxes with holes so small that the English Sparrow can not enter them. A silver quarter will give you the right size for a Wren hole; but punch holes in the bottom of the can or box, so that all water that runs in will also run out.

Shoot the English Sparrows from your premises, and better birds will take their places.

If a bold-hearted Robin elects to try wintering near you, feed him in winter, without fail. It is safe to say that many species of our song and insectivorous birds could easily survive the cold of our winters if they could obtain a constant supply of food. It is not the cold that drives them South, but the annual failure of their food supply.

For all game birds, the great action to be desired and sought is the enactment of ten-year close seasons, covering wide areas. To this the men who think only of to-day, and scoff at "the future," will strenuously object. They would rather annihilate the remnant to-day than have an abundance ten or twenty years hence. But they represent the spirit of destruction, and wastefulness of the resources of Nature. We are in no way bound to respect their views or their wishes. If the annihilators were given free rein, twenty-five years hence would see the United States as barren of bird life as the Desert of Sahara.

During the past ten years the champions of bird life have made their influence widely felt. In many a hard-fought contest the destroyers have been routed, horse, foot and dragoons; and we believe that on the whole, the American people have "not yet begun to fight" for their birds.



NIGHT-"HAWK."



Painted by CARL RUNGIUS.

WHITE-TAILED DEER.

THE WILD ANIMALS OF HUDSON'S DAY.

PART II.—THE MAMMALS.*

THE wild mammals today inhabiting the Hudson valley are but a pitiful remnant of the original stock that flourished here three hundred years ago. Head by head, they represent merely the individuals that man, the cruel annihilator, has not been shrewd enough to find and kill. They do indeed represent the survival of the fittest in "civilized" environment. Think of a civilization so cruel that it must curb, by the stern hand of the Law, many of its members from killing does and fawns, from slaughtering gray squirrels and song birds for "food," from robbing birds' nests, and exterminating wild life, generally.

So far as wild life is concerned, there are no greater savages, living or dead, than five per cent. of the people who wear the garb of "civilization."

"All the illustrations reproduced with this article are from "The American Natural History," copyright, 1904, by William T. Hornaday, and appear here by the permission of the publishers, Messrs. Charles Scribner's Sons. We repeat that every wild animal now alive in the state of New York owes its existence to its own skill in hiding, and in living in defiance of dangers and difficulties. The only species that has been for even a score of years under the law's protection is the White-Tailed Deer, or Virginia Deer, which, but for its marvelous cunning and skill in woodcraft would long ago have been exterminated with the elk and moose that once inhabited the Adirondacks.

Of course the White-Tailed Deer flourished abundantly in the days of the "Half-Moon." We can imagine that almost anywhere along the Hudson where the banks were generously planted with brush and timber, three centuries ago a hunter could have landed on the shore and in an hour brought back a deer. Even during the past two years, two wild White-Tails have been caught alive while swimming in the Hudson River, and one is now on exhibition in the Zoological Park.

So far as we know, the only wild game of the Hudson valley that came aboard the "Half-



1. OTTER.

2. FISHER.

3. MARTEN.

4. MINK.

Moon" was the flesh of a White-Tailed Deer. It was when that venturesome vessel reached the head of navigation of the Hudson River, probably near Troy, that the explorers found the Indians "very pleasant people." The Savages came on board, and brought "a great Platter of Venison, dressed by themselves; and they caused him [Hudson] to eat with them; then they made him reverence"; and after all this had been accomplished, on September 23, the "Half-Moon" started to return down the Hudson. At the Highlands, other Indians came aboard, and

"brought some small skinnes with them, which we bought for Knives and Trifles."

For two centuries the White-Tailed Deer was the best wild friend of the American pioneer. Many a brave family "on the frontier," fighting the wilderness and the Indians for the thing most dear to the native-American heart,-a free Home,-would have gone hungry, and perhaps found life actually insupportable, without the succulent flesh of the ever-faithful White-Tail.

It was indeed most fortunate for the American colonists that it was of almost universal distri-



AMERICAN BEAVERS AND THEIR WORK.
The dam, and house of sticks in the middle of the pond, are extreproductions of those works in the Beaver Pond of the New York Zoological Parts, as they were at the time this drawing was made.



AMERICAN BLACK BEAR.

bution throughout the timbered portions of the eastern United States. It is because of the important part played by the White-Tailed Deer in our colonial development that today we give its portrait the place of honor on our title page.

We are heartily glad that this is the most persistent species of all North American big game. It does not glory in the exhibition of its fine proportions at the risk of its life. On the contrary, it seeks the densest woods and brush cover that it can find, noiselessly steals through it with head and neck carried low and pointing straight forward, and leaves the honest and sportsmanlike still hunter only a trail of heartbreaking dimness. Thanks to wise laws and their rigid enforcement, the state of Maine today contains perhaps 100,000 White-Tailed Deer; and the hunting of the male "increase" furnishes legitimate sport for 3000 men, and an annual revenue to the state of more than \$1,000,000.

In our beloved Adirondack wilderness, this deer still exists; but it has been shot far too much. There are localities that now should be alive with deer, but in which none are to be found, save at very long intervals. During the past ten years, protection has had the curious effect of bringing a wave of deer migration from the north down through Connecticut to the Sound, and down the Hudson valley actually to the northern boundary of New York City. We possess a wild female that was caught in Yonkers!

The first wild-animal products of our coast that came into the hands of Hudson were furs, offered in trade by the Indians of the coast. The historian says that "many brought us Bevers skinnes, and Otters skinnes, which we bought for Beades, Knives and Hatchets."

In the days of the colonists, the first traffic with the Indians was for their corn and furs. Beyond all doubt, the first products of the Hudson valley that crossed the Atlantic were Indian-caught skins of Beaver, Otter, Marten, Mink and Muskrat. In early times, the Fisher was also among those present, but never in great abundance, and it soon ceased to be a



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THE PUMA, OR MOUNTAIN "LION."



Copyright, 1902, by W. L. UNDERWOOD.

THE RACCOON.



Copyright, 1902, by W. L. UNDERWOOD.
BAY LYNX.



WOODCHUCK.

prominent feature of the fur trade of the middle colonies. It is but natural that the men who risked so much in venturing to America, 300 years ago, should desire to carry back something that could be converted into cash. It was the animals named above that laid the foundations of the American fur trade, generally, and of the Hudson Bay and North American Fur Companies, in particular. It would take long columns of figures, in large sums, to represent the part played by the fur-bearing animals named above in the commercial development of the American colonies.

But there is one very interesting fact in this connection that we must set down. Of all the fur-bearing animals of the Hudson valley, the most persistent today are the Muskrat and the Mink. Strange as it may seem, for ten years they have been to the New York Zoological Park, jointly and severally, a great nuisance.

For eight years, or during the existence of several piles of large rocks near our northern boundary, wild Minks have raided our bird collections, and slaughtered Gulls and other fisheating waterfowl at a rate that was most exasperating. From 1900 to 1906 we killed in

the Park, annually, from three to five Minks: and they killed annually from ten to thirty of our birds. Now that their shelter rocks are gone, and the most of the Minks have been trapped and killed, we have peace.

Muskrats have been so abundant in the Bronx River and Bronx Lake, within our own grounds, and have done so much damage to our valuable aquatic plants, we have made war upon them, in self-defense. In the winter of 1908-9 a member of our force caught 23 of them, in our own waters.

The Otter once was abundant in the Adirondacks, and its range extended thence southward without a break to central Florida, where it still persists in living. It still is found occasionally in the North Woods, but it is doubtful whether it survives today in the Hudson valley anywhere south of Troy. So rare is this species throughout the United States it is no longer possible to secure alive and unhurt by traps a number sufficient to stock the largest zoological gardens of the eastern states. The steel traps, mills and sewage of civilization are too much for an animal that is dependent upon streams of water for



CANADA PORCUPINE.

its food and its life, and yet is not nearly so expert in hiding as is the muskrat and the mink.

When abundant and unmolested, the Otter amuses itself by establishing a "shoot the chutes" of its own, on a steep and slippery bank, ending in a water plunge. The Otter "slides," and the games played upon them, are well known to trappers and others who have lived or hunted where Otters were abundant.

In the time of Hudson, there were probably two million **Beavers** living in what is now the state of New York. About 1670 the Dutch province of New Netherland annually furnished to the fur trade 80,000 Beaver skins, and in 1623 the Beaver was formerly incorporated in the seal of that colony.

In 1860 the Beaver had so nearly disappeared from the Adirondacks and the Hudson valley that even in the former locality the total number alive was estimated at only 60 individuals. By 1895 this had fallen to "5 or 10." Since that date, 34 individuals have been set free in the Adirondacks, chiefly through the efforts of Harry V. Radford, and they are slowly restocking the North Woods.

The Black Bear, the Puma and the Canada Lynx once thrilled, and at times terrorized, the colonists of eastern New York; but gradually they all disappeared from practically every portion of New York save the Adirondacks and the Catskills. Strange to say, the largest animal of this trio, the Bear, has been most cunning and successful in resisting extermination. While the Puma is entirely extinct in this State, and the Canada Lynx practically so, the big and burly Black Bear joyously holds on, both in the Adirondacks and the Catskills. The familiar Bay Lynx still is in our midst, and one was seen in the Catskills, by H. W. Merkel and A. P. Dienst, in the spring of the present year.

The Raccoon once was an animal of practically universal distribution throughout the wooded portions of New York state, but its place in the list of fur-bearing animals has been fatal to its continued abundance. It still lives, however, even numerously in places, and still may be regarded as one of our most common quadrupeds of medium size. Firmly and persistently, it refuses to be exterminated, and so long as the forests remain, it will live to inhabit them. Today its fur is really valuable,—because better furs are so rare.

The members of the Order of Rodents, or gnawers, are today our most abundant wild



FLYING SQUIRREL.



GRAY SOUIRREL.

quadrupeds; and we are thankful that none of them yield "fur!" Thus far the rapacious maw of the "fur trade" has not demanded the skins of the Woodchuck, Gray Squirrel, Chipmunk, Flying Squirrel or Red Squirrel, But whenever any of those species are definitely placed in the class of fur-bearing animals, their doom is sealed. At present,—when not easily found and killed,—they are permitted to live and make glad the waste places.

Even the finest forest is half dead if it be destitute of the vital spark that wild-animal life alone can give.

In cheerful companionship and popular interest, the Gray Squirrel would be worth half a million dollars a year to the people of New York—if they would but let it alone! But where is the Gray Squirrel today? You may ride or drive in midsummer from one end of New York to the other without finding a single one alive, unless it is in a protected park!

Americans are queer animals. There are men and boys who still think it is "sport," and "hunting," to shoot squirrels,—under far less difficulty and danger than would lie in potting chickens in a farmer's orchard! And we Americans actually eat a rodent with flesh so rat-like that the white men of all other nations



EASTERN RED SOUIRREL.



EASTERN CHIPMUNK.

decline it. I refer to the Gray and Fox Squir-

It is indeed high time that the Gray Squirrel should be perpetually protected, everywhere throughout this gun-ridden state.

The delightful little Chipmunk is a thing of beauty, and its cheerfulness is a perpetual joy. Being very small and commercially valueless, it has not been pursued quite so persistently as



RED FOX.

the larger squirrels and rabbits; but for all that, the cat and the bad boy have made it rare everywhere outside of parks.

In the Zoological Park, it is really pathetic to see how quickly the wild creatures respond to protection, and make friends with those who will not permit them to be molested. Take the Grav Rabbit, as an illustration.

Eight years after the opening of the Park, Gray Squirrels, Chipmunks and Gray Rabbits had become very numerous within it, and almost fearless! In June, 1909, at midday, a wild Rabbit very leisurely hopped past me as I came out of my office, not more than twenty feet away, quite as confidently as if he owned the whole place. At fifty feet, all unafraid he halted close beside a big oak tree, in full view of fifty persons, leisurely examined the ground, and presently loped on across the grass into the shrubbery.

The reason? Our grounds are the only wooded lands in northern New York City in which stray dogs, cats, poachers and other vermin are not permitted to run at large. Two years ago our Chief Forester estimated that 75 wild Rabbits were living and breeding in our grounds. Of chipmunks we have hundreds, and of Gray Squirrels at least fifty. Needless to say, the children and all other people who love animals, are greatly interested by them.

The Great Northern Hare, gray in summer and snow white in winter, and once abundant, is now so rare that only the skilful "upstate" hunter can find one, in swamp or wilderness far from the haunts of men. It is a pity, too; for because of its great scarcity, and the fact that it does not thrive in captivity, this fine animal is almost as unknown and mythical to the vast majority of persons as the gyascutus.

By his continued existence in spite of traps, hounds, and guns of all sorts, the Red Fox has ably and satisfactorily demonstrated his right to live. Any sane person who knows the tremendous difficulties and dangers amid which any Fox of "civilization" lives and breeds, surely will not ask, as a serious question, "Do Foxes reason?" Excepting the real lovers of nature, every man's hand,-and firearm also,-is against him. The farmer hunts him for revenge, the trapper for his pelt, the hunter for sport. And yet, compared with that wonderfully sharp nose, and those keen eyes and ears, wireless telegraphy is slow and uncertain. Were it not so, there would not be today one living Red or Grav Fox this side of the Adirondack wilderness; but as it is, both those species joyously live and breed, even up to the very boundaries of the most populous city of America.



VIRGINIA OPOSSUMS.

In the distribution of the Marsupials, or mammals with abdominal pouches for their young, Nature almost overlooked North America! We have only the Opossum, nocturnal, sly, and so unobtrusive that in the northern United States it has reduced self-effacement to an exact science.

Some naturalists suppose that the most remarkable thing about this animal is its pouch;

but that is not the case. The strangest thing is that it knows enough to feign death in order to escape injury. I know, because in my boyhood days an Opossum deceived me so completely and thoroughly that I have not yet fully recovered from the shock. The animal very nearly escaped through the trick that it so skilfully played upon me; and since that day I have wished a thousand times that I had given that Opossum its freedom, as a reward of merit. But I did not think of it in time.

If our wild animals possessed as little reason and foresight as some men, all of them would have been killed or starved to death long ago.

PRESENT STATUS OF BIRD STUDY.

During the past ten years, the status of bird-study in America has undergone an important change. Yesterday was the day of the old-fashioned ornithologist,—diligent in the killing of birds in great numbers in order to study their geographic, seasonal, sexual and other variations, and also diligent in the differentiation of new forms. At the same time, under the sheltering guise of "scientific purposes," hundreds of thousands of the eggs of wild birds have been collected by unscientific men and boys, and stored away in dark cabinets,—to very small purpose.

The total number of birds and eggs collected during the past fifty years in the sacred name of science must be something enormous. Perhaps two per cent. of the entire slaughter have served genuine scientific purposes; but we doubt it.

To-day, it is no exaggeration to say that a large number of the people who are keenly interested in the birds of North America are weary of the once-popular studies of minute geographic variations, the making of new subspecies, and the vexatious changing of scientific names that, like the brook, seem destined to go on forever. The English names of our birds are in fact more stable and useful than those bestowed by the scientists.

To-day, the demand of the hour is for the utilization, in practical ways, of the enormous mass of American bird-lore that has been accumulated. The unscientific millions desire to know about our birds the facts that are useful to man, and helpful to the birds. Very unfortunately, the schools and colleges in which the foundations of natural-history teaching should be "truly and firmly" laid, as befits every foundations of the control of t

dation stone, are sadly blundering in the business of teaching teachers how to teach. As a whole, the situation is in a most unsatisfactory state. But the nature teachers are at least aware that something is wrong; and that is the first promise of better things. It is high time for even the dullest person to see that long and weary weeks spent on the anatomy of the grasshopper, butterfly, beetle and amoeba are not in line with the desires of bright boys and girls who want to know which are the most interesting, the most useful and the most injurious birds, mammals and reptiles of our country.

The study of natural history in public schools and colleges could be made as musical as Apollo's lute; and let us hope that some day it will be. Meanwhile, there is one great lesson that all may learn. It is this:

It is not always necessary to destroy wild life in order to study it. The study of birds can better begin with a bird book and a pair of sharp eyes than with a gun and a bushel of cartridges. The study of birds' eggs is all right, provided the birds of today do not have to pay the whole cost of it in fresh eggs. In the United States, the killing of birds for "scientific purposes" is now very rarely necessary, or justifiable.

The most advanced ornithologists of the present day are devoting their best attention to the study of living birds, and their relations to mankind. Practical aviculture is teaching many new and useful lessons which the study of dry skins and skeletons never have revealed. Mr. C. William Beebe, experimenting at the Park with live birds kept in atmospheres of varying degrees of humidity, has found that by means of an unusual degree of humidity it is easy to create new and startling "sub-species," literally "while you wait." It is unnecessary to point out the reasons why this discovery is of great practical importance to ornithologists.

Today, the highest duty of every lover of birds is to help protect the birds that remain. Nor is it necessary to have a speaking acquaintance with a bird before taking an interest in preserving it and its kind from annihilation. It is impossible to afford birds too much protection, too much immunity from the forces of destruction. Every child should be taught that without the assistance of the birds that destroy annually millions of noxious insects, rodents, and tons of seeds of noxious weeds, our country soon would become a barren waste.



LARGE BIRD-HOUSE AND ITALIAN GARDEN IN BAIRD COURT.

THE ZOOLOGICAL PARK OF OUR DAY.

By WILLIAM T. HORNADAY.

Photographically illustrated by ELWIN R. SANBORN.

DESPITE the greed and blood-lust of man, civilized as well as savage, this gun-ridden world still contains a marvelous array of wild life. It is right to speak of the animate portion of Nature's works as the animal kingdom. Man himself is the king of beasts, but there are many assistant kings and princes and potentates, some of which are in certain ways almost as interesting as himself.

Even in this day of endless travel and travelers, it is not everyone who can go to the ends of the earth; and of the human millions, only a very small percentage can make it possible to see many wild creatures in their haunts. Yet do people of intelligence desire to know the wild life of the world; and so we have systematic collections of animals, living and dead.

The highest function that any wild animal can serve, living or dead, is to go on exhibition,

as a representative of its species, to be seen and studied by millions of serious-minded people.

The imperial City of New York presents to the world her Zoological Park, and invites mankind to behold in it a huge living assemblage of beasts, birds and reptiles, gathered from every region of the globe, kept together in comfortable captivity, and skilfully fed and tended, in order that millions of people may know and appreciate the marvels of the Animal Kingdom. To make a Park and collection worthy of the fauna of the world, and of the metropolis of the New World, has been a gigantic task; but the people of New York have proven equal to it, and the result is now practically complete.

After three years of planning, and ten years of very strenuous work, we say that the Zoological Park is "practically complete;" and so

it is. Wise men will understand what we mean. We do not say that nothing more ever will be added, or that in the future no more improvements will be necessary. The actual work of building our Zebra House and Eagles' Aviary yet remains to be done; but both together are but a bagatelle, like the building of a garden summer-house for a stately mansion that is complete and occupied.

These pages are intended only as an invitation to the world to come, enter in and possess the New York Zoological Park. They are not intended as an exhibit of the dry bones of Detail. New York has dedicated to Zoology a princely and priceless domain of land and water, and she has almost unreservedly entrusted it to the wisdom and judgment and vital energy of the men who have made the New

York Zoological Society.

On this marvelous site,—the most glorious handiwork of Nature ever placed within, or even near, a great City,-the Zoological Society expended in accommodations for animals a full quarter of a million dollars. That was just ten years ago. Having seen this evidence of good faith, the City of New York then generously-but not extravagantly or foolishlyopened her treasury, pledged her credit, and bore the expense of all the remainder of the permanent improvements. And at the same time, the City began to furnish annually a sum of money sufficient to maintain becomingly the new institution. This was done, not reluctantly nor grudgingly, but with a big-hearted generosity "that made the gift more precious." The work of creating the Zoological Park has not halted for a single moment since the keel of it was laid on November 5th, 1906, when the "Preliminary Plan" was approved by the Executive Committee.

The "Preliminary Plan" of the Director was carefully expanded into an elaborate and beautiful "Final Plan," which was approved by Mayor Strong and the Board of Park Commissioners in November, 1898. It is impossible to overstate the importance of that exhibit of the intentions of the Society to the progress of the Zoological Park. Other builders of American zoological parks may well follow the example of New York in having their future developments planned by competent experts for twenty years in advance.

In round numbers, the Zoological Society has expended on the Zoological Park and its animals about \$475,000; and on the buildings and other "ground improvements" the City has expended a little more than \$2,000,000. And

what is there to show for all this? This is a highly condensed answer:

Of large and fine buildings of the first rank, of brick and stone, there are to be seen the following:

The Elephant House,

" Lion House,

" Primates House,

" Large Bird-House,
" Aquatic Bird-House.

" Administration Building,

" Reptile House,

" Small Mammal House,

" Ostrich House,

" Antelope House,

" Small-Deer House,
" Pheasants Aviary.

Of buildings of secondary importance there are:

The Service Building,

" Asiatic Deer House,

" Red Deer House,

" Axis Deer House,

Elk House,

" Camel House,
" Llama House.

" Goats House,

" Buffalo Barn,

" Feed Barn,
" Wild Horse Barns (2).

" Rocking Stone Restaurant,

" Boat House.

Of open-air installations for wild mammals and birds,—several of them very elaborate and costly,—there are the following important features:

The Bear Dens,

' Flying Cage,
' Wolf Dens.

" Mountain Sheep Hill,

" Fox Dens,

" Sea-Lion Pool,
" Alligator Pool,

" Duck Aviary,

" Wild-Fowl Pond,

" Otter Pools,
" Beaver Pond,

" Burrowing Rodents' Quarters,

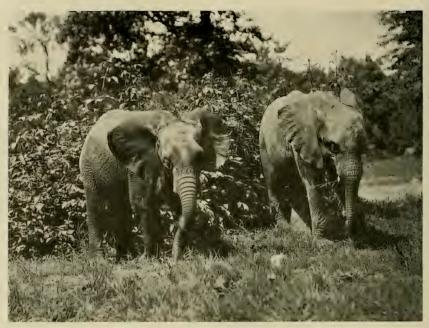
" Prairie-Dog Village,

" Puma House.

Of all the features named in the three lists given above, all save four are devoted to the systematic exhibition of living mammals, birds and reptiles. The list of secondary buildings gives not even a hint of the unequaled exhibition series of open-air ranges, surrounded by steel posts, steel wire and concrete foundations, that have so generously been provided for our herds.



NUBIAN GIRAFFES IN THE NEW YORK ZOOLOGICAL PARK.



THE AFRICAN ELEPHANTS, KARTOUM AND SULTANA.

of bison, elk, wild sheep, wild goats, ibex, and deer of all kinds.

It was an English critic who said that our open-air installations for animals are "at once the envy and the despair of all European zoologists." The finest ranges in the world for captive hoofed animals are those of the Duke of Bedford, at Woburn Abbey, England; and the herds within them are both in variety and in number, wholly beyond compare. But those herds are not on exhibition, and they can be seen only by a special invitation from the owner.

It is to be noted here that of the eleven large and important animal buildings enumerated in the first class, each one save the Reptile House is provided with an elaborate and extensive series of open-air yards in which every habitant has, in mild weather, a daily opportunity to spend hours in the sunlight and the open air, freely exercising or lying at ease in the shade. The elephants and rhinoceroses, the lions and tigers, the apes and baboons, the big African antelopes, the tropical deer, the ostriches and cassowaries, and even the smallest creatures of the many in the Small Mammal House, all have

their out-door quarters, and enjoy them to the full.

For humane men and women there is small pleasure in the contemplation of living creatures that are in prisons, and that look and feel like prisoners, pining behind their bars. Better no "zoos" and no wild animal collections than miserable and unhappy prisoners! A badlymade or badly-kept "zoo," or zoological garden or park, is worse than none. But, at the same time, it is folly for anyone to say that all zoological gardens and parks are dens of cruelty, -as is held by a few extreme humanitarians. The creatures in the collections of the Zoological Park give unimpeachable testimony to the contrary. If our bears, our hoofed animals, our birds and our apes and monkeys are not positively happy, and full of the enjoyment of life, then none are in this world, either captive or free. Today, the life of every free wild creature is constantly filled with alarm, with flyings from danger, and with the daily struggle for food, water and safety. Every hunter knows that after every mouthful of food, the wild animal or wild bird looks about for dangerous

enemies; and the ultra-humanitarians take small note of the millions of wild lives that are pulled down and destroyed by predatory enemies.

Of the great array of rare and interesting mammals, birds and reptiles today on exhibition in the New York Zoological Park, many pages would be needed to convey of them even a faint impression. The collections have been formed strictly on scientific lines. There are no half-breeds, no "curiosities," and no freaks of any kind save a few albinistic individuals.

On July 15th, 1909, an enumeration of the individuals and species alive and on exhibition in the Park showed the possession of the following:

TOTAL CENSUS OF WILD ANIMALS IN THE ZOOLOG-ICAL PARK, JULY 15TH, 1909.

	Species.	Specimen
Mammals	246	743
Birds	644	2816
Reptiles	256	1969
Total	1146	5528

To the average mind, however, these figures convey but a slight impression, even when we state that in individuals we have the largest number (by about 1000) to be found today in any zoological garden or park.

Regarding the quality of our animal collections, a few words must suffice.

By way of illustration, what must the visitor think of a collection of African hoofed animals that contains a Mountain Zebra and Grant Zebra, two species of Elephants, a pair of Black Rhinoceroses, a Hippopotamus, a pair of Giraffes, a Sable Antelope, a Kudu, a Bakers Roan Antelope, an Addax, two species of Gnu, a Beisa, a breeding pair of Leucoryx Antelope, an Eland, a Waterbuck and a Wart-Hog?

And what shall be said of a collection of deer that contains a herd of Eld's Burmese Thameng, a herd of Barasingha, herds of Indian and of Malay Sambar; herds of Axis, Sika, Fallow, Red Deer, Wapiti of two continents, Kashmir Deer (Hangul), and pairs and singles of at least a dozen other species?

Consider for a moment the bears,—seventeen species, represented by 37 specimens, including four species of the gigantic Alaskan Brown Bear group, represented by seven specimens.

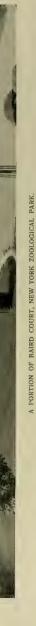
The collections of apes, baboons and monkeys, and of small mammals and large cats, are quite as rich as those mentioned above. The collections of birds are fairly bewildering in variety and zoological richness. When any Zoological Park exhibits nearly 3000 live birds, of different kinds and sizes, gathered from a hundred different localities, there is no need to comment on the rank of the collection. And when it contains such feathered rarities as the California Condor, Harpy Eagle, Bateleur Eagle, Trumpeter Swan, Whooping Crane, Sun Bittern, Seriema, South American Trumpeter, Gyrfalcon, Sea Eagle, Yellow-Necked Cassowary, Hyacinthine Macaw, Black Cockatoo, Black-Backed Pelican, Ptarmigan, and a hundred smaller varieties, its scientific value is beyond question.

Of reptiles, the array is very comprehensive. It contains five species of Rattlesnakes, the King Cobra, Spectacled Cobra, Bushmaster, Fer-de-Lance, Puff Adder, five species of Crocodilians liberally represented, and Pythons, Boas, Anacondas, small Serpents, Lizards, Iguanas, Turtles, Tortoises, Terrapins and Amphibians in great variety.

The labeling of the living creatures in the Zoological Park, with descriptions, pictures, maps and charts, is far beyond the best results accomplished in that line elsewhere.

Thanks to the marvelously perfect site of 264 acres that New York City has provided for her exposition of living wild creatures, and thanks also to the wise use that has been made of it by the Zoological Society, the New York Zoological Park is today the foremost institution of its kind. It is no exaggeration to say that it is in a class by itself. Its grounds, its buildings and out-door compositions for animals, are of unrivalled excellence, and in zoological value its collections are now equal to the best elsewhere. This plain statement is made with full knowledge of what the world has done in this field. and what animal collections exist elsewhere. The elaborate official report of Dr. Gustave Loisel to the French government (1907-8) has enabled all the world to know the relative standing and merits of the zoological gardens and parks of the world.

This Bulletin has been called for by the Hudson-Fulton Celebration Commission as a means of placing before the public certain facts regarding the wild life of eastern New York, and a zoological institution that as yet is inadequately known, even to the people of the Empire State. If the effort that has been made here, by the first City of America, were today anything else than the best of its kind thus far created, then would we need to apologize for a failure.



Showing the Large Bird-House for Perching Birds, and the Sea-Lion Pool.



POLAR BEAR DEN IN THE NEW YORK ZOOLOGICAL PARK.

THE NEW YORK ZOOLOGICAL SOCIETY AND ITS WORK.

O institution is greater than the organization that created it.

But for the New York Zoological Society, and the forces that it gathered to its aid, there would today be no New York Zoological Park. Even with the finest building materials ready to the hand of the builder, it is not given to every man, or every organization of men, to rear a monumental structure, and finish it ere the world grows weary of waiting.

Surely the Zeological Society may be regarded as one of the most remarkable of New York's many and diverse human products. Organized in 1895, at a period when to many it seemed as if New York's private philanthropy had been drained to its depths by museums, libraries, hospitals and botanical gardens, the hour of its birth seemed inauspicious. And to a very great extent that handicap did exist, and remains upon the Society to this day! The institutions referred to above have been endowed bountifully,

by money given in large sums, and therefore counting up rapidly. But not so this Society. From 1895 to the present hour, no sum larger than \$5,000 ever has come into our treasury from one donor at one time; and the only bequest ever received was one for \$100!

But it was ordained in the beginning that the Zoological Society should succeed, and do much with little. The three declared objects of the Society always have been—the making of a Zoological Park, the protection of our native animals and the promotion of zoology.

The first and by far the most serious of these tasks was undertaken first, and vigorously prosecuted. The result is in evidence, and can speak for itself. The second and third objects have not been pursued as diligently as the first, because of the practical impossibility of conducting three great campaigns simultaneously. Now, however, the scientific work of the Society, and its greater work for the protection of wild life, will be taken up on a new basis.



The original impulse and effort for the creation of the New York Zoological Society came from Madison Grant, then a sportsman and student of nature, and by profession a lawyer; and very early in its career the new organization secured the active support of Prof. Henry Fairfield Osborn. It is impossible to overstate the influence of those two men on the Society's undertaking, and their devotion to the task, year in and year out. Without them, New York would have at this time no Zoological Park!

I regard the Executive Committee of this Society as the most remarkable body of men with which I ever have come in contact. The manner in which those men of great affairs regularly, and even joyously, left "their mirth and their employment," to spend from two to four hours at a time in hard-working business meetings, month after month, for thirteen years, was, to at least one man, both an object lesson and an inspiration. Talk about civic pride, and the duties of good citizenship,—the Zoological Park is a lasting monument to that spirit as it exists in the 1666 members of this Society; and in saying this, we only render unto Cæsar the thing that is his.

For eleven years,—1898 to 1909,—the composition of the Executive Committee of the Society remained almost unchanged. Its members were:

Hon. Levi P. Morton, ex-officio, President of the Society.

Prof. Henry Fairfield Osborn, Vice-President, Chairman for seven years; now President.
Madison Grant, General Secretary.

Charles T. Barney, Chairman for three years, Treasurer four years.

John L. Cadwalader, Counsel. William White Niles, Attorney. Percy R. Pyne, Treasurer.

Samuel Thorne.

Capt. John S. Barnes. Gen. Philip Schuyler.

The vacancy caused by the death of Mr. Schuyler has recently been filled by the election of Mr. William Pierson Hamilton.

During the thirteen years of the Society's existence, the Executive Committee has held 169 meetings, and only one of them was without a quorum.

In 1899 the Zoological Society set the pace by expending nearly \$250,000 of its own funds in the erection of the Reptile House, the Aquatic Bird-House, the Bear Dens, Flying Cage and about eighteen smaller installations for animals.



HARPY EAGLE.



AMERICAN BISON BULL, IN THE ZOOLOGICAL PARK.

The people of New York looked at the quality of the work, and saw that it was good. In fact, the public was surprised, both by the magnitude of the plan, and the permanence of all improvements. Then the City of New York cheerfully joined the Society in the remainder of the work. The Society of course was given absolute control of the Park, it furnished all plans, and virtually superintended all improvement work. The Park Department has stood in a position to safeguard all the interests of the taxpayers, and has awarded and superintended all large contracts for construction. Throughout eleven years of rushing improvement business, involving nearly a hundred contracts, great and small, the business of financing and building the Zoological Park has gone steadily on, without a single halt or an unpleasant episode between the representatives of the City and the Society. In their turn, Mayors Strong, Van Wyck, Low and McClellan, and Comptrollers Fitch, Coler, Grout and Metz have cordially cooperated in the work. The Park Department of the Bronx has been most helpful, and we recall with particular pleasure the cooperation of the three long-term Commissioners, Moebus, Eustis and Berry, and their Chief Engineer and Chief Clerk, Martin Schenck and Gunther K. Ackermann.

While it is impossible to mention here even one-tenth of the generous people who for ten years or more have loyally supported the Zoological Society in all its undertakings, there are a few whom we must name, regardless of space limitations.

The members of the Executive Committee, the majority of whom have given the Society liberal sums of money, have already been mentioned.

We have received substantial aid from Andrew Carnegie, William Rockefeller, William C. Whitney, Jacob H. Schiff, Oswald Ottendorfer, Miss Helen Miller Gould, C. P. Huntington, William E. Dodge, George J. Gould, J. Pierpont Morgan, Col. Oliver H. Payne, Mrs. Frederic Ferris Thompson, Robert Goelet, George F. Baker, Edward J. Berwind, Frederick G. Bourne, Charles F. Dieterich, Emerson McMillin, F. Augustus Schermerhorn, John D. Rockefeller, William D. Sloane, Mrs. John B. Trevor, Mrs. Antoinette Eno Wood, William K. Vanderbilt,



THE CALIFORNIA CONDOR.



MOVING THE ALLIGATORS TO WINTER QUARTERS.

C. Ledyard Blair, Hugh J. Chisholm, George Crocker, Cleveland H. Dodge, E. H. Harriman, Mrs. Philip Schuyler, Lispenard Stewart, Miss Caroline Phelps Stokes, Mrs. Frank K. Sturgis, Tiffany and Company, Charles H. Senff, Cornelius Vanderbilt, Samuel D. Babcock, James C. Carter and Morris K. Jesup.

In addition to the above there are 38 Patrons, 189 Life Members and 1397 Annual Members whose constant and liberal support fairly en-

titles each one to honorable mention.

In mentioning the men who have made the Zoological Park, the public owes more than it ever is likely to know—or to fully repay—to the intelligence, the judgment, the constant devotion and the tireless energy of these officers of the Zoological Park:

H. Raymond Mitchell, Chief Clerk and Manager of Privileges.

Hermann W. Merkel, Chief Constructor and

Forester.

C. William Beebe, Curator of Birds.
Raymond L. Ditmars, Curator of Reptiles.
George M. Beerbower, Civil Engineer.
E. R. Sanborn, Photographer and Editor.
William I. Mitchell, Office Assistant.
E. H. Costain, Captain-of-the-Watch and As-

sistant Forester.

One phase of the business relations between the city government and the Zoological Society merits especial notice; and it may well be considered outside of New York as a lesson in material progress.

In nearly every city of the world, the upbuilding of important institutions either wholly or partly paid for from public funds, is so hedged about with safeguards and checks upon possible dishonesty that oftentimes the rate of

progress is distressingly slow.

During the administration of Mayor Van Wyck, Comptroller Coler and Park Commissioner Moebus, it was decided that in the making of "miscellaneous ground improvements,"a heading which has embraced a-thousand-andone undertakings of a nature almost impossible to "specify" in advance, and put into contracts, -it was decided that the Zoological Society should have the utmost liberty permissible under the law. As a result, we have been enabled to make double the progress with far less expenditure of money, and with 50% better results, than would have been possible under a rigid adherence to the contract system. The work done by men selected solely on their ability and merits, and directed day by day by our own officers, has been the salvation of the Zoological Park; but it was possible only because the city government had faith in the business ability and

integrity of the Board of Managers of the Society.

All the animals of the Zoological Park are the property of the Zoological Society, either having been presented by its members, or purchased out of the profits of the privilege business created by the Society through Mr. Mitchell, under our contract with the City. The statistics of the collection have been published elsewhere in this BULLETIN.

Now that the Zoological Park is practically complete, the Society must take up more vigorous and extensive work in the field of wild-life protection, and the promotion of zoology. Much important work lies in sight, demanding attention. Nothing short of an endowment fund of \$1,000,000 will enable the Society to do its whole duty in the two fields that it has as yet been unable to enter vigorously. The duty of all zoologists and nature-lovers to the cause of wild-life protection is conceded by all intelligent men, and requires no demonstration save practical work in the vineyard. The Society desires to devote six thousand dollars a year to wild-life protection; and it is well known that our fast vanishing wild life needs the effort.

But let it not be supposed that during the past twelve years the Society has ignored this cause. On the contrary, ever since 1897 the Secretary and the Director of the Park have put forth a continuous series of efforts, covering game fields in need of work in Newfoundland, Alaska, British Columbia, Mexico, Montana, Wyoming and New York. It would be possible to enumerate several important results achieved in those fields through the efforts of the Society and its officers.

Because of the Zoological Society's satisfactory business methods in connection with the Zoological Park, the City Department of Parks, in 1902, requested the Society to assume control of the New York Aquarium, and place it upon a permanent scientific basis. The growth and the character of that institution today are testimonials to the wisdom of the actions which placed it upon a permanent basis, and selected Charles H. Townsend as its Director.

On November 9th, the Zoological Society will enter upon a new period of its history. The completion of the Administration Building, just ten years to a day from the opening of the Park, practically ends the period of strenuous construction, and opens up new fields of labor. With the aid of the endowment fund that the Society has a right to expect, important results may be achieved in the protection of wild life and the diffusion of useful zoological knowledge.



THE CONCOURSE AND NORTH END OF BAIRD COURT.

Administration Building on the left, Italian Garden in Centre, Bird-House on the right, Primate's House in the distance.



THE HERD ON ITS RANGE.

THE WICHITA NATIONAL BISON HERD.

PRESENTED TO THE NATION BY THE NEW YORK ZOOLOGICAL SOCIETY.

It seems strange that the East should undertake the task of restoring to a permanent basis in the West an important wild-animal species that was destroyed by the men of the West.

Greed and blood-lust is not, like the tariff, a local issue. It is thoroughly cosmopolitan. Wherever there is found an abundance of wild-animal life, there will be found also the buzzards of commerce destroying life and "wrecking" carcases. It was the men of the West who got up the wild and bloody orgy of the buffalo plains, and left behind them only foul carcasses, poisoned air and desolation.

Strange to say, however, the West has shown little more than a bystander's interest in the effort now being made to establish the American Bison species on national ranges with such a degree of permanency that it will endure for the centuries of the future. Most of the appeals of the Bison Society for contributions from beyond the head of the Ohio River have fallen on deaf ears and tightly-closed purses. The West as a whole has yet to learn what it is to give dollars for the preservation of wild life; but the record of Wyoming and Colorado in feeding starving Elk, last winter, constitutes a fine exception.

For many years, various individuals have urged Congress to "do something" for the Bison. I think it was the efforts of Col. "Buffalo" Jones, of Kansas, that finally resulted in the establishing of a national Bison herd in the Yellowstone Park. It cost a mighty effort, backed by the Biological Survey, to secure through that grand champion of wild life, Congressman John F. Lacey, of Iowa, the sum of \$10,000 for that nucleus.

Later on, the New York Zoological Society conceived the idea of a corporate sacrifice in behalf of the Bison, and proposed to the government a partnership arrangement for the founding of a new herd. The Society offered a nucleus herd of 15 pure-blood Bison as a gift, delivered on the ground, provided the National Government would set aside 12 square miles of fine grazing grounds, on what once was the range of the great southern herd, fence it in, and permanently maintain the herd.

The offer was promptly and graciously accepted, the money involved was immediately voted, and the fence was creeted in a very satisfactory manner. Without any unnecessary delay, the Zoological Society selected 15 of the finest Bison in the Zoological Park herd, and with most generous aid from the American and Wells-Fargo Express Companies (who carried the herd free of all cost), the gift was delivered at the southern boundary of the Wichita National Forest and Game Preserve in southwestern Oklahoma.



THE ROCKY MOUNTAIN GOAT IN NEW YORK.

In view of the peculiar difficulties and impossibilities surrounding all attempts to induce our mountain sheep, caribou and moose to live on the Atlantic Coast, the successful acclimatization of a herd of Rocky Mountain Goats in the Zoological Park becomes of special interest.

In October, 1905, five kids, then about five months old, were personally conducted from Fort Steele, British Columbia, to New York, and established in and about the rustic Goat House in the southwestern corner of the Park. The flock contained three males and two females,—all of which elected to live and thrive. They were given two well-shaded yards paved with macadam, a brushy hillside of dry earth, and the roof of the barn to clamber over. It was quickly discovered that in this low altitude, the Mountain Goat can not endure rain, especially in winter; and it has been our fixed policy to house the herd whenever a rain-storm appears.

On May 20, 1909, one of the females gave birth to a lusty male kid, which she successfully reared. Her offspring is now so large, so vigorous and so free with his horns, it has been necessary to saw off the skewer-like tips of his horns for the general safety of the other members of the herd. Little "Philip" is apparently quite as large and vigorous as any wild male goatlet of similar age.

Unfortunately for the mother, her maternity effort at this altitude was fatal to her. After nursing her offspring to weaning-time, she died of what was really a general exhaustion of her vitality.

The four original members of the herd remain in perfect health, but the other female has not yet bred. They continue to be shy of the human hand, and although they will approach almost within reach, they will not permit anyone to handle them, not even their keeper.

The illustration above shows one of the males with his long, shaggy winter coat not yet fully developed.



A BIT OF LAKE AGASSIZ FROM THE JUNGLE WALK.



GREVY ZEBRA FROM SOUTHERN ABYSSINIA.

TWO RARE ZEBRAS.

Of all living Zebras, the rarest and the most sought are Grevy's Zebra, from northern Somaliland and Abyssinia, and the Mountain Zebra, from the mountains of Cape Colony. The former is comparatively new to the zoological world, having been discovered and described as late as 1882, when it was named in honor of the president of the French Republic, to whom the type specimen was sent by King Menelik. Of that rare species, Menelik maintains what is well-nigh a close monopoly, and few specimens ever reach the outside world that have not first passed through his hands.

The Grevy Zebra is distinguished by its large size, very narrow stripes that extend quite down to the hoofs, and its large ears.

The Mountain Zebra is a smaller species, marked by very wide stripes on the hindquarters only, and narrow stripes elsewhere. It is found only in the mountains of Cape Colony, and by the game protectors of that colony, its total number is estimated at only 400 individuals.

We are fortunate in possessing fine examples of both the species noticed above.

ZOOLOGICAL PARK VISITORS.

In determining the popularity of any public institution, it is the inexorable recording turnstile that tells the story. Being somewhat removed from New York City's center of population every visitor to the Zoological Park represents a special effort, and something expended for ear fare. In view of all this, these figures of our monthly attendance for 1908 are of interest:

	1908	Increase.
January	42,356	2,887
February	37,801	10,224
March	77.841	10,583
April	118,384	27,833
May	182,192	20,706
June	187,656	19,622
July	159,797	
August	190,813	160
September	153,007	26,187
October	120,952	30,239
November	91.642	26,463
December	51,299	
Total for the year1	,113,743	175,201



LONG-HAIRED CHIMPANZEE "AUGUST" AND BALD-HEADED CHIMPANZEE "BALDY."

Pan satyrus schweinfurthi (Giglioli)
Sudan and Uganda,
Equatorial West Africa.

Equatorial West Africa.

HOW TO REACH THE ZOOLOGICAL PARK.

For ten years, many of the newspapers of New York have constantly endeavored to inform their readers that the Zoological Park is in the Bronx! The energy and persistence with which we are Bronxed, year in and year out, is worthy of a real public necessity. If there were in New York City an assortment of zoological parks, then would we cheerfully accept "Bronx" as a part of our name; but there is only one Zoological Park hereabouts, and Jonas Bronck never dreamed of founding it.

The Zoological Park ("in the Bronx") is most easily reached by the eastern branch of the Subway. To-day the trains are marked "Bronx Park" and "West Farms;" but we are informed that in a short time our trains will be marked "Zoological Park." To reach the center of the Zoological Park from Wall Street requires about 55 minutes, and from the Grand Central Station about 40 minutes. The Subway terminus is at 180th Street, only two short blocks from our Boston Road Entrance, and the Boat House.

Visitors coming up on the Third Avenue Elevated should alight at Fordham Station, and either walk or take a surface car eastward on Pelham Avenue for nearly half a mile. The Interborough cross-town lines on 180th Street, and also on 189th Street, land visitors near our two western entrances.

CARRIAGES AND AUTOMOBILES.— The route from lower New York for carriages and automobiles is through Central Park, Lenox Avenue, Macomb's Dam Bridge, and Jerome or Washington Avenues to Pelham Avenue, thence eastward to our new Concourse Entrance, at the Bronx River bridge. Vehicles with visitors may enter the Park at that point, and land them at the steps leading up to Baird Court.

PAY DAYS AND FREE DAYS.—The Park is free on all days of the week save Mondays and Thursdays. On those two pay-days an admission of 25c. for adults is charged to all persons who are not members of the Society.

The Official Guide to the Zoological Park, fully illustrated, can be obtained at all entrances, for 25 cents.



PENINSULA BEAR CAPTURED AT MOELLER BAY, ALASKA PENINSULA.

A GREAT COLLECTION OF BEARS.

If properly established, no captive wild animals more fully repay their cost and keep than a collection of bears that has been judiciously formed. It is true that they are very trouble-some comforts, and that every big bear is a storm-center; but we like them, for all that. When comfortably installed in large, clean yards, with plenty of sunlight, fresh water, rocks to climb upon and a good variety of food, they are full of action, and constitute a great attraction to visitors.

From the beginning, we have striven to bring together as many as possible of the species of bears with which the public is but little acquainted. First we devoted special attention to the Alaskan Brown Bears,—the giants of the genus Ursus,—and to-day we have four good species, with the prospect of a fifth one when a certain young animal matures. One of these has come to us from north of the Arctic Circle, only 300 miles south of Point Barrow (the most northerly point of Alaska), which is the most northerly habitat for a bear of this group.

We have also recently secured,—after ten years of constant effort,—a black bear from South America, which represents the form described by Oldfield Thomas as *Ursus ornatus majori*. Of our old friend, the Rocky Mountain Grizzly, we have specimens from several different localities.

The following is a list of our specimens and species, as the collection stands to-day:

* *	*
2 Polar Bears	Ursus maritimus.
2 Kadiak Bears	" middendorffi.
2 Yakutat Bears	" dalli.
1 Admiralty Bear	" eulophus.
1 Peninsula Bear	" merriami.
1 Arctic Brown Bear	" undetermined.
3 Grizzly Bears	" horribilis.
9 Black Bears	" americanus,
1 Syrian Bear	" syriacus.
2 Brown Bears	" arctos.
2 Hairy-Eared Bears	" piscator.
1 Himalayan Black Bear	" torquatus,
1 Japanese Bear	" japonicus,
2 Yezo Bears	" ferox.
1 Sloth Bear	" labiatus.
2 Sun Bears	" malayanus.
1 Andes Black Bear	" ornatus majori.
3 Hybrids, born here.	
37 specimens, representing 17 spe	ecies.



NORTH FACADE AND DOME OF THE ELEPHANT HOUSE. Heins & La Farge, Architects.

THE ELEPHANT HOUSE.

F the building operations in the Zoological Park, the most important single feature is the Elephant House. Of ten years construction work, it is the climax; and it is fittingly crowned with a dome. It is situated on the site prepared for it by Nature, and chosen twelve years ago, on the axis of Baird Court, and in the open space midway between the Court and the Wolf Dens. In effect, it connects the two great groups of installations of the northern and southern regions of the Park which until now have been slightly separated.

We believe that this effort represents highwater mark in zoological building construction. It is spacious, well lighted, beautiful in its lines, both externally and internally, beautifully ornamented without being overdone, and also wholly free from useless extravagance. The interior lighting and cage "effects" are highly satisfactory, the light upon the animals being quite sufficient, without being too strong and glaring. It is clearly evident that the animals enjoy their cages; for were it otherwise, the African rhinoceros would not, almost daily, gallop round and round, and with ponderous agility often leap into the air.

In several important particulars the Elephant House is unlike all other buildings in the Park. It is high; it is entered at the center of each side, instead of at each end; it is built entirely of stone; it has a main roof of green tiles, and has a lofty dome covered with glazed tiles laid in an elaborate color pattern of browns and greens. The dome is finally surmounted by a "lantern" of elaborate tile work, also in colors. Excepting the dome, the whole exterior structure is of smoothly dressed Indiana limestone. Each entrance consists of a lofty and dignified archway, in which the doors are deeply recessed; and each of these arches is grandly ornamented by animal heads, sculptured in stone.

The color effects of the interior are particularly pleasing. The large, flat bricks of the Gustavino arch system are in their natural colors, and form a blending of soft brown and buff shades that not only avoids monotony, but is pleasing and restful to the eye. Combined with the vaulted ceilings of the main halls and the cages there are a few strong arches of mottled buff brick which harmonize perfectly with the ceiling tiles of the main dome. This scheme of vaulted ceilings is so new that few persons ever have seen a finished example. Both the main dome, and the arched ceiling below it, have been

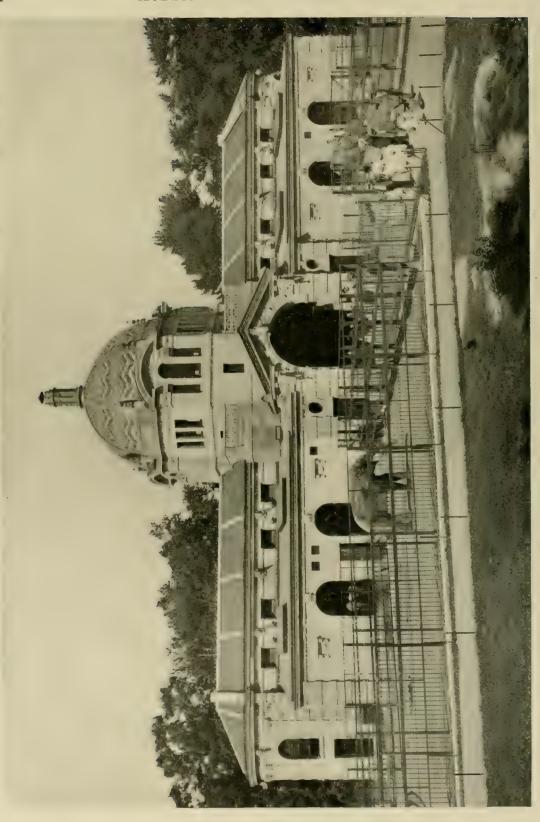
constructed by Gustavino without the employment of either the steel rafters or ribs which one naturally expects to see in such structures.

Each of the eight immense cages, that to-day contain elephants and rhinoceroses, has been designed to frame and display its living occupant as perfectly as a frame fits a picture. The vaulted ceilings and large central skylights are particularly well adapted to cages for extra large animals, and the lighting is quite perfect. The front of each cage-24 feet-is spanned aloft by a single Gustavino arch, and is unspoiled by intermediate columns. Each cage is 24 x 24 feet, which is ample for elephants and rhinoceroses of the largest size. To a height of 6 feet the walls are lined with plates of quarterinch steel; and nothing less powerful than a locomotive could break through or break down the front bars and beams. The outside doors are marvels of strength and smoothness in action. They are of four-inch oak, reinforced with quarter-inch steel plates, and on the inside they are strengthened against attack by three heavy movable beams of steel.

The ground plan, and all cage and vard arrangements of the Elephant House, were designed by the Director of the Zoological Park. The architects were Messrs. Heins & La Farge. The animal sculptures on the southern half of the building were executed by A. Phimister Proctor, and those on the north half are by Charles R. Knight. The building was erected by the F. T. Nesbit Company, with John C. Coffey as Superintendent of Construction. The steel fences enclosing the yards were designed by George M. Beerbower, Civil Engineer of the Zoological Park staff, and the macadam and masonry construction work in the yards and surrounding walks was performed by our own force, under the direction of Hermann W. Merkel, Chief Constructor.

The total cost of the building was \$157,473, and of the surrounding yards, fences and walks \$27,159, making for the entire installation a total of \$184,632. This is \$16,000 less than the original estimate.

The Elephant House contains a surpassingly fine and valuable collection, consisting of 2 Indian Elephants, 2 Sudan African Elephants, 1 Congo African Elephant, 1 Great Indian Rhinoceros, 2 African Black Rhinoceroses, 1 Hippopotamus, 2 American Tapirs and 1 Indian Tapir.



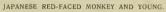


INDIAN ELEPHANT "GUNDA" IN HIS NEW QUARTERS AT THE ELEPHANT HOUSE.



MALE HIPPOPOTAMUS.







YOUNG MEXICAN PUMA.

IMPORTANT ACCESSIONS FROM AFRICA IN 1909.

- 1 Wart-Hog. 2 Black-Footed Pen 1 Greater Kudu. 1 Hyaena Dog. 4 Egyptian Geese. 1 Mountain Zebra. 2 Black-Backed Jackals. 2 Bateleur Eagles. 2 Grant Zebras. 1 Caracal. 2 Vulturine Sea Eagles. 1 Congan Sitatunga. 1 Cheetah. 2 Touracous. 2 Speke Sitatungas. 1 Hyrax. 1 Golden Oriole. 1 Duiker Antelope. 1 Broad-Nosed Crocodile. 1 Rock Timpun.
 - 2 Black-Footed Penguins.
 - 2 VULTURINE SEA EAGLES.



TAMANDUA: PREHENSILE-TAILED ANTEATER.



TREE PORCUPINE.

ZOOLOGICAL INSTITUTIONS OF NEW YORK

HOLDING EXHIBITIONS UNDER THE AUSPICES OF OR IN COOPERATION WITH SCIENTIFIC, HISTORICAL AND ART COMMITTEES OF THE HUDSON-FULTON CELEBRATION COMMISSION

AMERICAN MUSEUM OF NATURAL HISTORY, Seventy-seventh Street, from Columbus Avenue to Central Park West. Open daily, except Sundays, from 9 a. m. to 5 p. m. Sundays from 1 to 5 p. m. Always free. Special Exhibition during the Hudson-Fulton Celebration, from September 1st to December 1st. Original objects showing the life and habits of the Indians of Manhattan Island and the Hudson River Valley. (Special illustrated catalogue for sale, price 10 cents.)

Take Sixth or Ninth Avenue Elevated Railway to Eighty-first Street, or Subway to Seventy-ninth Street; also reached by all surface cars running through Columbus Avenue or Central Park West.

BROOKLYN INSTITUTE, Eastern Parkway. Open daily, except Sundays, from 9 a. m. to 6 p. m.; Sundays from 2 to 6 p. m. Thursday evenings from 7.30 to 9.30 p. m. Free except on Mondays and Tuesdays when admission fee is charged of 25 cents for adults and 10 cents for children under six years of age. Collection illustrating various departments of Archæology, Mineralogy and Ethnography. Special Exhibition relating to past and present life of Indians on Long Island. Portrait of Robert Fulton painted by himself, the property of Col. Henry T. Chapman and loaned by him to the Museum. Open September 1st to December 31st. (Illustrated catalogue for sale.)

Take Subway Express to Atlantic Avenue, or Flatbush Avenue Trolley from Brooklyn Bridge. St. John's Place surface car from Atlantic Avenue or Borough Hall.

CHILDREN'S MUSEUM (Brooklyn Institute), Bedford Park, Brooklyn Avenue. Collection illustrative of the fauna of Long Island. Open free to the public from Monday to Saturday (inclusive) from 9 a. m. to 5.30 p. m., and on Sunday from 2 until 5.30 p. m.

NEW YORK AQUARIUM, in Battery Park, under the management of the New York Zoological Society. Open daily, including Sundays, from 9 a. m. to 5 p. m. until October 15th. (October 16th to April 14th, from 10 a. m. to 4 p. m.) This building was erected in 1807 by the United States Government as a fort and after the War of 1812 was called Castle Clinton; later, as Castle Garden, it was the scene of Jenny Lind's triumphs, and from 1855 to 1890 it was the portal of the New World for 7.690.606 immigrants. This is the largest aquarium in the world and contains a greater number of specimens and species than any other. All tanks containing fish indigenous to the Hudson River will be so marked.

Take Elevated Railway to Battery Place Station, or Subway to Bowling Green Station; also reached by all surface cars which go to South Ferry.

NEW YORK ZOOLOGICAL PARK, under the management of the New York Zoological Society, in Bronx Park. Open daily, including Sundays, from 9 a. m. until an hour before sunset (November 1 to May 1 from 10 a. m.). Free, except on Mondays and Thursdays, when an admission fee of 25 cents is charged. Exhibition of a splendid collection of Animals, Birds and Reptiles. The fauna of Henry Hudson's time on Manhattan Island and in the Hudson River Valley will be indicated by the flag of the Hudson-Fulton Celebration. (Special illustrated catalogue describing same for sale.)

Take Subway trains marked "Bronx Park Express" to terminus at 180th Street, or Third Avenue Elevated to Fordham Station. The entrances are reached by numerous surface cars.



THE NEW YORK ZOOLOGICAL PARK IN 1909

LATEST OFFICIAL MAP

ZOOLOGICAL SOCIETY BULLETIN

No. 36

Published by the New York Zoological Society

October, 1909

REPORT ON EUROPEAN TRIP.

By RAYMOND L. DITMARS.

WITH a special fund of two thousand dollars for the purchase of mammals, birds and reptiles, the writer left New York on the 8th of last May, for a tour of the Zoological Gardens of England, Holland, Belgium, France and Germany, and an inspection of the animal markets in those countries. Besides the fund for the purchase of animals, needed for our collections, the writer took with him a large series of reptiles to be used in exchange with the Zoological Gardens of London, in obtaining similar specimens for the Park. The east-bound passage was made on the S. S. "Minnetonka" of the Atlantic-Transport Line. A trans-shipment

from the Red D Line steamer "Philadelphia" from Venezuela, which lot was made up of mammals and birds collected and donated to the London Zoological Gardens by Captain Albert Pam was taken charge of by the writer, when the collection arrived in New York and cared for together with his shipment of reptiles. The writer arrived in London without losses during the voyage.

The animal market in England during the spring and early summer of 1909 was the poorest in some years. A thorough canvass of all the shops in London, Southampton, Plymouth and Liverpool, resulted in but few purchases of



MOUNTAIN ZEBRA; FEMALE



SALT-MARSH CROCODILE.

mammals, although a fair series of reptiles was obtained. A month later, after returning from the Continent, the writer found conditions somewhat improved, and two weeks steady work, spent among the animal shops of London and Liverpool, and watching the arrival of incoming vessels, from the Indian and African ports, resulted in an interesting series of purchases. A very large and valuable collection of reptiles was gathered.

On the Continent the conditions were much the same. There was a marked scarcity of primates and miscellaneous small mammals. A large series of important and showy reptiles was purchased of Hagenbeck, at Stellingen, (Hamburg). At the model menageries of Ruhe and of Reiche, at Alfeld on the Leine, some rare hoofed animals were collected, among these being a Mountain Zebra, Equus zebra; a fine male example of the Greater Kudu, Strepsiceros capensis, a pair of Speke's Sitatunga, Limnotragus spekei, and a male Bontebok, Damaliscus pygargus.

Review of the Animals, Birds and Reptiles Purchased.

The writer's purchases for the Park made a shipment of forty-eight cages, which were placed aboard the Atlantic-Transport, S. S. "Minehaha," which left London on the 3rd of July. The shipment was made up of over four hundred specimens, representing one hundred and cleven species. For the care of this big, miscellaneous lot of mammals, birds and reptiles, the writer necessarily arranged for a great variety of food to be placed on the steamship and owing to very courteous coöperation on the vessel, he was enabled to so utilize the ship's

refrigerators, that the food remained in perfect condition throughout the passage to the home port; this relating to the meat, fish and soft fruits, during a period of nine days transit. The writer was fortunate in finding aboard the vessel several experienced hostlers returning with stock from the London Horse Show. These men were soon trained to assist him in the cleaning of the cages, although all feeding operations were personally performed by the writer, this work consuming about three hours, daily. While the entire shipment was insured for full value in London, there were no losses during the trip.

Among the mammals brought over is an interesting series of viverrines, including the African Kusimanse, Crossarchus obscurus, Suricate, Suricata tetradactyla, North African Genet, Genetta vulgaris, Small Indian Civet, Viverra civettina, Large African Civet, Viverra civetta, White-faced Paradoxure, Paradoxurus musanga, and the Two-spotted African Palm "Cat," Nandinia binotata. All of these species are new to our collection. Among the canines are a pair of Black-Backed Jackals, Canis mesomelas, and a Thibet Fox, Vulpes vulgaris alpinus, the latter an exceptionally rare and beautiful animal. A pair of almost black, South American Skunks, Mephitis suffocans, are among the Carnivores.

The most interesting animal added to the Park collection is a Cape Hyrax, Hyrax capersis. Although this animal looks much like the American woodchuck, in fact has all the general outlines and actions of a big rodent, it has long been classed by zoologists among the hoofed animals. It is characterized by the front teeth of the upper jaw, which protrude in tusk-like fashion. Though of chunky build it



NILE CROCODILE.

is an agile climber, and is gifted with a particularly vigorous temper. This animal was purchased from a London dealer, and is the first of its kind to be exhibited in the Zoological Park.

Owing to the scarcity of Primates in the European markets, the writer obtained but few monkeys and lemurs. Among these animals his most important purchases were a Coquerel's Dwarf Lemur, Microcebus coquereli, and a pair of Golden Marmosets, Midas rosalia. The latter is a beautiful species, covered with long, silky hair, of a uniform golden color. Owing to the hair falling in a mane over the neck and shoulders, the species is sometimes called the Lion Marmoset. This was another species quite new to the Park collection.

A fine series of the larger Egyptian Jerboa, Dipus aegyptius, was obtained for the Small Mammal House. These curious rats make a lively exhibit. Two females and a male of the Coypu Rat, Myocastor coypus, were also among the rodents. A pair of Vulpine Phalangers, Phalangista vulpina, a pair of Scoty Phalangers, P. canina, Mauge's Dasyure, Dasyurus viverrinus maugei, the Common Dasvure, D. viverrinus, Bridled Kangaroo, Onychogale frenata, and a fine example of the Tasmanian Devil, Sarcophilus ursinus, made up the list of marsupials. The latter was included in the material from the Zoological Gardens of London, offered in exchange for a list of reptiles taken over.

In the series of birds brought over are the following: Patagonian Burrowing Owl, Speotyto cunicularia, Tawny Owl, Syrnium aluco, Bleeding-heart Pigeon, Phlogoenas luzonica, Picd Flycatcher, Muscicapa atricapilla, Jackass Penguin, Spheniscus demersus, Varied Hemipode, Turnix varia, Satin Bower-bird, Ptilon-

orhynchus violaceus, Carrion Crow, Corvus corone, Rook, Corvus frugilegus. With one or two exceptions these birds formed part of the exchange list from the Zoological Gardens of London.

It was among the reptiles that the most successful and elaborate series of purchases were made. Over fifty species new to the Park are now on exhibition in the Reptile House. For the first time since the opening of the Reptile House, we have a highly interesting series of the poisonous snakes of Australia, which we are exhibiting in a specially constructed case. Three species are exhibited—the Purple Death Adder, or Australian Black Snake, Pseudechis porphyriacus, the Gray Death Adder, Denisonia superba, and the Tiger Snake, Brachyaspis curtus.

Of these the Purple Death Adder is represented by a young male specimen. This is a handsome species, of a lustrous purplish-black. with a row of scarlet scales on each side of the body. There are six specimens of the Gray Death Adder, all fully grown (about five feet long) and looking much like our American "coachwhip snake." The Tiger Snake is represented by two mature specimens, each about twenty-four inches long. This reptile derives its name from the tawny bands that encircle the yellowish body. All of these snakes slightly dilate the neck, when angry, in cobra fashion. They are vicious, highly active and very poisonous. Of the three the Purple Death Adder has the most extensive range, being found over a great part of the Continent of Australia. The Grav Death Adder inhabits Southern Australia and Tasmania. Of the three species the Tiger Snake is particularly interesting. It attains a maximum length of two and one-half feet, is very common in Western Australia and owing to several phases of its make-up, is thought to represent the ancestral stock (terrestrial) from which sprung the poisonous marine serpents of the East Indies.

In addition to the exhibit of poisonous Australian serpents, two fine examples of Australian pythons, the Diamond Snake, Morelia spilotes, and the Carpet Snake, Morelia variegata, were placed in the collection. Of closely allied species, a beautiful young Regal Python, Puthon reticulatus, from Borneo, two specimens of the Congo Python, P. sebae, a Madagascar Boa, Boa madagascariensis, and a Madagascar Tree Boa, Corallus madagascariensis, were added. The latter named species stand as spectacular types of freak distribution. In their structure they are wonderfully like the South American members of the Boida, which they also resemble in size and coloration. With South America the headquarters of the Boaine snakes, and the tropics of the Eastern Hemisphere, the habitat of the pythons, it seems remarkable that the Island of Madagascar should contain these two species of showy boas, absolutely separated from all allied forms.

A very good series of the harmless serpents of Europe was obtained, which collection has been grouped as one of the features of the Reptile House. The following species of snakes are represented in this series: English Grass Snake, Tropidonotus natrix, Spotted Grass Snake, T. natrix asteptrophorus, Dalmatian Water Snake, T. natrix murorum, Tessellated Water Snake, T. tessellatus, "Viperine" Water Snake, T. viperinus, Dahl's Snake, Zamenis dahlii, Smooth Snake, Coronella austriaca, Cat Snake, Tarbophis vivax, Leonard Snake, Coluber leopardinus, Four-Raved Snake, C. quatourlineatus, and Aesculapian Coluber, C. aesculapii. The latter named species is of great historical interest. In the time of the early Romans it was believed to be the messenger of Aesculanius, the God of Healing. Its appearance was always considered the omen of some gracious action on the part of that particular deity. This belief gained such strength that writers of ancient history record the fact that the Legions carried a number of these sacred reptiles on their great expeditions.

Besides the species of European snakes a full series of the Continental lizards was obtained. The handsomest species among these is the Occellated Lizard, Lacerta occellata, from southern Europe. The large males are of spectacular coloration-bright green with blotches of rich blue on the sides. The larger examples have a head slightly over two inches in width. Showy lizards of India, Africa and Australia were also added to the collection. The star specimen purchased is a huge Ceylonese Monitor, Varanus salvator, over seven feet long and with claws as large as those of a leopard. During the time the writer was finishing his purchases in England, this big lacertilian was placed on exhibition in the Reptile House of the London Zoological Gardens, where his great size, aztivity and habit of swallowing eight to ten hen eggs entire, attracted much interest. The Monitor is now on exhibition in a large cage on the main floor of our Reptile House, immediately west of the cage containing the big pythons. Chameleons of several species, Spiny-Tailed Lizards, Glass "Snakes," Slow

"Snakes," Slow "Worms" and the like figure among the better known lizards obtained.

With the purchase

of an elaborate series of tortoises and turtles, the outside vards of the Reptile House are stocked with the best collection exhibited since the opening of the Pork. The most showy of the new chelonians are the Radiated Tortoise, Testudo radiata, three specimens from Madagascar, and four specimens of the Leopard Tortoise, T. pardalis, from Abyssinia. Over a dozen species, of five genera, are rated among the new aquatic chelonians.



SPINY-TAILED LIZARD.

In the purchase of crocodilians the writer was fortunate in obtaining a half-grown example of the Broad-Headed Crocodile, Osteolaemus tetraspis, from Sierra Leone, the bony head of which causes it to be quite characteristic. In addition to this species were a young Nile Crocodile, Crocodilus niloticus, a Salt-Marsh Crocodile, Crocodilus niloticus, a Salt-Marsh Crocodile, C. porosus, from Sumatra, and a young example of the Broad-Snouted or Horned Caiman, Caiman latirostris, from the Amazon. The Horned Caiman is also a great prize. Like the Broad-headed Crocodile it is for the first time exhibited in our Reptile House.

The writer feels particularly proud of the collection of batrachians obtained abroad. The result of the addition of representative series of toads, frogs, salamanders and newts, are several grouped exhibits on the main floor of the Reptile House-features we have long needed, as the batrachians, with their varied strange forms and brilliant colors are always of great interest to the public. An enormous Japanese Giant Salamander was bought of Carl Hagenbeck and now occupies a commodious tank. A case containing a number of species of Tree Toads has been arranged and attracts much attention. This contains the gorgeously-hued Golden Tree Toad, Hyla aurea, of Australia and five other species. A series of fourteen cages now forms an exhibit showing the frogs and toads of Europe. The most attractive among the new batrachians, however, are a dozen specimens of the strange Aquatic Toads, from Africa, these representing two species:-Xenopus laevis and X. muelleri. These eccentric creatures are strictly aquatic-never leaving the water. The hind feet are extremely broad and the graceful swimming movements of these animals at once suggest the actions of broad-finned fishes. The eyes are small and placed directly on the top of the head.

We have placed these toads in a conspicuous tank and they form a novel exhibit. Explanatory labels tell of their relationship to the Surinam Toad, Pipa americana, of South America, which they resemble in structure and habits. They differ from the Pipa in the breeding habits, however, the eggs being attached singly to water plants or stones. The tadpole is provided with a pair of long tentacles, causing the larva to resemble an elongated catfish.

With the close of his report the writer wishes to express his hearty appreciation for the hospitality extended in London, by Dr. P. Chalmers Mitchell, Secretary of the Zoological Society of London, and Superintendent R. I. Pocock, of the London Zoological Gardens. Without the valuable assistance given him, in providing a headquarters with the presence of skilled keepers, it would have been practically impossible to care for his rapidly accumulating collection and to place the animals on board ship in good condition and well caged. The food required for this miscellaneous collection involved about everything used in feeding animals. Head-keeper Hockingdon, of the London Gardens, supervised his carpenters in making up a series of substantial travelling cages to take the places of those sent from the dealers-which latter cages were lacking in conveniences for feeding and cleaning. Scrapers and other trevelling paraphernalia were also made at the Zoological Gardens in London-in fact, everything done to facilitate a successful shipment across the Atlantic-and with the results already described.



PURPLE DEATH ADDER.

NEW FEATURES IN THE EUROPEAN ZOOLOGICAL GARDENS.

By RAYMOND L. DITMARS.

TAVING recently returned from an inspection of the zoological institutions of Great Britain and the Continent, the writer begs leave to present a general résumé of his observations on the newer features of interest. The tour in question embraced the zoological gardens, private collections and museums, as follows:-(England)-Gardens of the Zoological Society in London; the collection of hoofed animals of the Duke of Bedford, at Woburn; the Natural History Museum and Aquarium in Liverpool. (Holland)—the Zoological Gardens in Amsterdam; the Zoological Gardens in Rotter-(Belgium)—the Zoological Gardens, Antwerp. (France)—the collection of animals in the Jardin des Plantes, and the Museum within the same boundaries. (Germany)-Zoological Gardens, at Cologne, Frankfort, Dresden, Berlin, Hannover, Halle, Hamburg; Hagenbeck's Tierpark, at Stellingen (Hamburg).

Among the new features in the Zoological Gardens of London are the Prosectarium and Quarantine House. The former was well on its way to completion when the writer left London, in July. It forms a new floor over the Reptile House and is constructed along the lines of a research laboratory, with three large, separate working rooms, each brilliantly lighted with large windows facing the north. Immediately in the rear of the Reptile House is the new

Quarantine Building, a brick structure with all conveniences for the isolation and examination of newly arrived animals.

Among the newly arrived animals in the London Gardens was the Takin, Budorcas taxicolor, exhibited for the first time alive in any zoological collection. Another rare animal was an Aard Vark, which was yet under observation in the Quarantine Building. In the Small Bird House was a magnificent series of Birds of Paradise of over half a dozen species—the series filling the big wall cages on each side of the building. All of these birds were in splendid condition, and the writer was informed that once in captivity they are as hardy as crows. It is their capture in New Guinea, and the risk of extended transportation from the home country, that cause their rarity in captivity. The collection of primates in the London Gardens was in superb condition-the coats of the animals fairly glowing with health. Superintendent Pocock informed the writer that the temperature of the Monkey House is kept quite low during the winter, - often registering as low as 10° Fahrenheit. All of the monkeys are provided with sleeping-boxes, packed with hay. The Rhesus Monkey, Mandrill, Hamadryas, Thoth and Chaema Baboons, remain out of doors throughout the winter. They are provided with sleeping-boxes and hav bedding, but the sleeping-boxes are not furnished with artificial heat. All of these specimens were in superb condition.

Zoological Gardens in Amsterdam.—'The Monkey House in Amsterdam is ideal. This structure appears to the writer to offer the most perfect sanitary conditions of any animal building in Europe. It has many novel features, among them being elaborate skylights made up of racuum tiles. This offers the great advantage of ideal illumination, with its germicidal effects, yet without the heat in summer, or cold during the winter months, that comes with a building with a great area of illuminating surface. The writer noted the use of these vacuum glass tiles in Rotterdam, also, and it was explained to him that they prevent the passage of heat or cold as they are cast hollow, and then subjected to an air extracting process. With its white tiled floor, its central fountain, cages with glazed tiles and brilliant, though diffused illumination, the effect of this building is that of beauty, wonderful cleanliness, and perfect sanitation,-particularly on account of the absence of woodwork.

Amsterdam has the most interesting and ingeniously arranged collection of insects of any such installation noted by the writer. There is an elaborate series of cases containing feeding caterpillars and others hung with masses of developing cocoons, from which numerous showy moths were hatching. On the walls were cases with fine mounted displays of the life histories of the lepidopterous insects of Holland. most striking feature among the series of entomological exhibits was a display of ants. These were enclosed in narrow square glass cases. about three feet long and high. The nest was made of cement, and had been burrowed and channeled with great care to imitate the tortuous chambers naturally made by the insects. The exhibit was then mounted in the shallow case to appear as a transverse section of a big ant mound. On the front of the case is a black cloth curtain, to keep the exhibit dark,-this may be raised at the will of the visitor. When the curtain is raised the channels are seen alive with ants performing their various duties. The workers are seen caring for the larvæ, and in one case, quite spectacularly quartered in the center, was a large queen ant, attended by her busy consort. Also exhibited in the Insect House was a curious collection of walking "sticks" and several jars of ant "lions," which little insects lie at the bottom of a funnel-shaped burrow of fine sand, the jaws only protruding. Unwary ants that pass near the edge of this burrow are brought down by a miniature shower of sand hurled up by the "lion." The jars of aquatic insects demonstrated the interesting possibilities in an exhibit of this kind. About every zoological garden on the continent has its insect house-several of these are of recent installation. An installation of this kind would be of great interest in New York.

Among the rare reptiles in Amsterdam, the choicest specimen was an example of the Bornean Gavial, Tomistoma schlegeli. The head and snout of this remarkable creature might be compared to a banjo with a long handle. The beautiful Aquarium was very fully stocked. The Electric Eel and Electric Cat-Fish were exhibited in adjoining tanks. In the batrachian room was a tank containing a number of examples of the Blind Salamander from the Adelsberg Cave, in Austria.

Rotterdam Zoological Gardens.—Through the courtesy of the Director, Dr. J. Büttikofer, the writer was enabled to witness and appreciate at the Rotterdam Zoological Gardens, one of the

most interesting zoological spectacles in Europe. This consists of the heronry, tenanted by wild birds, and situated immediately outside of the big flying eage. A large collection of wading birds was on exhibition in the flying cage, and a number of these were nesting. Inside the cage was a stork on her nest, and the young could be observed lifting their heads for food. This presence and nesting of the captive birds had attracted the wild Blue Heron, many pairs of which had built the great rookery in the tall trees immediately outside the flying cage. From this rookery comes a continual gutteral croaking, and there is a constant procession of the old birds coming and going, their long legs trailing behind them in picturesque fashion. From the masses of nests may be seen the wobbly heads of the young, clamoring for food, or crowding out on dangerously swaving branches were well feathered youngsters unsteadily clutching their lofty perches in an eager watch for the parents' return. Dr. Büttikofer informed the writer there were eightytwo nests in this wonderful rookery. Seventeen big nests, coarsely constructed of sticks and brush, were counted in a single tree. The old birds have a half-hour's flight to get to their fishing grounds.

The Monkey House in Rotterdam resembles the Amsterdam structure in the liberal use of glazed tile. The monkeys run into outside cages for the greater part of the year, passing through doors which swing either way, and which the animals operate with as much nonchalance as climbing their perches.

The new Reptile House in Rotterdam is a fine and practical little building. Here the writer again noted the use of the glass vacuum tiles, -- practically the entire roof being of this construction,-which causes the building to be flooded with diffused sunshine. The cage decorations were beautifully arranged,-a combined use of tuffstone, moss, earth and plants imparting a very natural effect. The earth was neither too dry nor too wet-hence the reptiles appeared to be in exceptionally good condition. The brilliant illumination of the building appears to effect this condition. There was an excellent series of reptiles. The Rotterdam and Frankfort Gardens are way in the lead as regards reptile collections on the Continent. Among the more interesting reptiles noted in the Rotterdam Reptile House were the Gaboon Viper, African Cobra, American Diamond Rattlesnake, Regal Python, Black-Tailed Python,

Australian Diamond Python and Carpet Python, a full series of Crocodilians, lizards of many species and a series of tortoises—among the latter being two specimens of Testudo clephantina, from the Aldabra Islands.

Antwerp.—Although there appears to be no recent installation in the Antwerp Gardens, new specimens are constantly added. A long, high cage, with artistically painted background, offered a spectacular display owing to its contents, which consisted of over two dozen Flamingoes and seventy-five Purple Gallinules. 'The smaller, irridescent birds, running in every direction among the tall pink forms of the flamingoes offered a striking display.

Cologne.—Of particular interest in the Zoological Gardens is the breeding of two Giraffes, both of which are in perfect condition. One example was born on May 26th, 1907, and the latest arrival, on April 4th, 1909. This youngster was alert and active when the writer inspected him the following June after his birth. He was about 6 ft. in height, with wisps of black hair standing on that portion of his head from which the horns will grow.

Frankfort.—The collection of reptiles in the Frankfort Gardens is particularly noteworthy. The reptiles are housed in the top of a grottolike structure. The walls of the reptile enclosure are of the vacuum tiles previously mentioned, which, together with a glass roof floods the place with light. Among the lizards were a number of fine chameleons, the Australian Tiligua, Spike-Tailed Lizard, Zonurus, Tegus, and a full series of the lizards of Europe.

The collection of batrachians was very complete, embracing the Blind Salamander of the Adelsberg Cave, Giant Salamander, Hellbender, South American Toads of several species and many Tree Toads. The collection of snakes was the finest on the Continent. Especially interesting among these were the Gaboon Viper, Puff Adder, Russell's Viper, Horned Viper, Desert Viper, Sandnatter, Cape Viper, Australian Blacksnake and Indian Cobra. There is a good representative series of North American serpents.

Berlin.—The magnificent Gardens in Berlin offered nothing particularly new, but it is interesting to note the successful breeding of the Giraffe here, in April of this year. While noting this subject it should be mentioned that a Giraffe was also bred in the London Gardens last year, and is in thriving condition.

Berlin is fortunate in having on exhibition a number of specimens of the wild Guinea "Pig," Cavia porcellus, of South America. These animals look like fat, tailless gray rats and are extremely timid. Owing to the rigid quarantine existing against South American rodents, it is now impossible to import this interesting animal.

Zoological Gardens at Halle.—At Halle on the Saale, delightfully situated, ingeniously laid out, and with many novel features, is a zoological institution that promises to be among the most interesting in Europe. The gardens of Halle offer a series of surprises: for the winding walks that lead up the hill to the mountain goats, thence down to other installations, bring one unexpectedly upon changing scenes, exhibits and all sorts of pleasing nooks and vistas of the surrounding landscape. These gardens are young and the buildings not elaborate in number as vet, but everything is ingeniously quartered and there is a valuable collection. There is a marked fraternal spirit in the exhibit of some of the animals. The Indian Blackbucks and Ostriches were running in the same enclosure. The Camels and Yaks roamed together, and in a medium-sized cage was a rollicking family of Raccoons and Coatis. Few zoological gardens can boast of a more picturesque site and such possibilities of interesting development as the Gardens at Halle.

Hamburg.—A new feature of Hagenbeck's Tierpark, at Stellingen, is the Ostrich Farm, situated immediately across from the main entrance of the Tierpark, and being distinct in requiring a separate admission of 50 pf. It is well worth the visitor's time to inspect this novel venture. Mr. Hagenbeck informed the writer that he expects his birds to grow much finer plumes in the cold climate of Hamburg than those ostriches on farms in the hot countries. There are ten breeding houses, each with two long yards and separate compartments. Each of these houses is intended to accommodate a pair of birds. A great central yard and commodious shelter building accommodates the main herd. A very complete incubator, with capacity for a great number of eggs, is part of the exhibit. The ostrich farm was opened in July, with one hundred and ten ostriches-all of the species being represented.

Prior to the opening of the Ostrich Farm, the main herd of birds was running in a fifteen-acre pasture. The multitude of long necks, above which towered the heads of some really gigantic

males, formed an imposing picture.

ZOOLOGICAL SOCIETY BULLETIN.

Elwin R. Sanborn, Editor.

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OCTOBER, 1909

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DEPARTMENT OF AMERICAN AVICULTURE.

EDITED BY C. WILLIAM BEEBE, Curator of Birds.



FULL LENGTH VIEW OF THE DUCK AND SWAN ENCLOSURE.

BREEDING CANADA WILD GEESE ON CHINCOTEAGUE ISLAND, VA.

By C. WILLIAM BEEBE.

NDUSTRIES connected with semi-wild birds are becoming more and more important every day. We have large Pheasant hatcheries which have been installed in many states during the last few years, while the providing of suitable nesting sites for Eider Ducks has been in practice for many years in different places. As far as I know the only successful example of raising Canada Wild Geese for their feathers, is to be found on the estate of Mr. J. W. Whealton on a good-sized island off the coast of Virginia, close to the Maryland line.

Chincoteague Island is about seven by two and a half miles in size, with a soil which is sandy but fertile. Low ridges run parallel to the coast, separated from each other by marshes, while a central depression filled with salt water extends transversely across the center of the island. There is considerable scrub pine and cedar growth with some underbrush, the trees and bushes being found mostly upon the ridges. Much of the island, however, is open and marshy. Mink are very abundant and destructive, and while Foxes are also common they seem to do little harm.

More than fifty years ago Mr. Whealton obtained a pair of wing-tipped wild geese. These, however, showing no signs of breeding, he disposed of, and purchased a second pair which had been raised in captivity. These were the nucleus of his present flock which now numbers about 450 birds. There has been no inbreeding as new blood has been constantly added by the capture of wing-tipped wild ganders every year or two. At times wild birds have come in from the bay with the tame ones, and fed with them for several days. Great effort is made to get the big leaders of the flocks. Wild ganders breed at once, but it is years before the wild geese will consent to lay. Mr. Whealton's geese are divided into flocks of from four to fifty birds, running wild on this and several adjacent islands. All are pinioned when small goslings.

There is considerable population on Chincoteague, but the geese do no damage and the fact that they are all the property of Mr. Whealton is known to everyone. The geese rarely die from disease, although a few succumb to pneumonia. Negroes steal a small number, but the greatest loss is from dogs which kill quantities of the geese every year. In 1908 no fewer than twenty-six dogs were killed in the very act of slaughtering the geese.



CANADA GEESE AND TOULOUSE HYBRIDS.

The geese feed on the island in summer in small gangs; but in winter they spend most of their time in Chincoteague Bay, feeding on eel grass and sea lettuce. They become very fat on this diet and in addition are fed a little grain now and then to keep them tame. They are also supplied with fresh water throughout the winter. In the spring, on one of the first warm days in March, the Canada Geese pair off, gathering near the large breeding pastures, when they are let in, one pair at a time. There is a great deal of quarrelling among them and a

few pairs are always broken up.

The geese are grain fed for a short time before laying, all through incubation and until they are set at liberty with their young. The birds are never infested with lice, and it is thought that their feathers contain some quality which keeps these pests out.

The breeding paddock encloses about 25 or 30 acres and is surrounded by a board fence about 3 feet in height. About 75 pairs of birds breed here and raise from two to three hundred young annually. There are a few small fresh water marshes in the paddock, and where these occur num-

erous hummocks are thrown up, which soon become covered with grass and low brush. These tiny islands are the favorite nesting sites and five to seven eggs are laid on these nesting hummocks. When the young hatch, they are pinioned and turned into another pasture with their parents. If the goose is removed, the gander will rear the young successfully. But if the gander is killed by accident or sent away, the female will not or cannot rear her brood alone.

Some of the birds are almost fifty years old. They breed better when thirty than when ten years of age. A few individuals never mate. In the spring, one

familiar with the appearance of the birds can select those which will lay, by the condition of fatty deposits visible under the skin. If considerable yellow fat is visible about the abdomen, there is no likelihood of the bird laying eggs that season.

When the goslings reach the age of about one month, they are given their liberty. They usually do not breed until three years old. Each pair of adult birds mate for life and invariably returns to the nest which it had occupied the previous spring. The geese will not as a rule



DUCK AND SWAN ENCLOSURE; COMPARTMENT No. 1.
Containing Black Australian Swans and Cygnets, Shoveller Ducks, Wood Duck and Black Brant.



SNOW GEESE HYBRIDS, CHINCOTEAGUE ISLAND.

allow other pairs to nest within fifty to one hundred yards. The ganders are very erratic in this respect, some being especially savage, while others do not object to new comers founding their nests a shorter distance away. The birds are strictly monogamous. In the fall, all deformed or undersized birds are disposed of, and only the largest and finest are kept. Many young birds are sold for ornamental purposes and for decoys.

According to Mr. Whealton and the men who have charge of the birds, there seem to be two so-called races, known as the Northern and the Southern Wild Geese. The latter are smaller and darker and differ greatly in their habits. They are very wild, never becoming tame; are sly and tricky, of a cowardly disposition, and do not interbreed with the other race. They have been eliminated from the flock because of their undesirable traits, but a few are kept by other people, as they breed fairly well.

The geese are plucked three or four times each year, beginning with May first, and from then on at intervals of seven weeks; all of the contour feathers with the exception of those of the wings, tail and neck are taken, the down of course being left. An average adult bird yields about one-third of a pound at a picking, and the market value of these feathers is about 50c. a pound. The first picking (May 1st) occurs when the birds are tending their young. It stops to a certain extent the fighting which is always going on at this time; both by reducing the strength of the birds and by making it less

easy for them to obtain a good hold, or to strike each other with their wings. The first and last pluckings yield the heaviest feathers; the mid-summer plumage being lighter. At these times a large party of men and boys corral the geese from various parts of the island into a large pen. As the geese are picked they are liberated.

That Chincoteague Island is adapted not only for the rearing of wild geese alone, is shown by the success which Mr. Whealton has had with other species of water birds. The swans.—Mute, Whooping and Black, are simply turned

out in pairs, separated from others. They are kept there continually, and when once they have started to breed, they continue to do so every year. All of the paddocks have plenty of forage, but the birds are fed daily on wheat and corn. During the present year the Black Swans made their nest and laid their eggs when the snow was on the ground, hatching their young in February, when the pond was frozen tight. A hole was cut in the ice and the young, four in number, were successfully raised.

Hybrids have been produced between Canada Geese ("Northern" Race), and Toulouse, Embden and Chinese Geese. These hybrids lay eggs but they are never fertile.

Crosses between the Common and Snow Geese are fertile and have been bred back to pure Snows for several generations, the hybrids being indistinguishable from pure-blooded Snow Geese. Toulouse hybrids are very large birds with the body color of a Toulouse, but with the head and neck very nearly white. They are invariably sterile.

The Chinese hybrids, when young, are a shade darker than the Canada Geese. When they reach adult plumage, they become lighter in color, and only one who is accustomed to them can distinguish them from pure-blooded Canada Geese.

The Snow Geese hybrids were originally produced with a white Common Goose and a Snow gander. The offspring are usually white with dark wings and sometimes dark tails also. They retain the mandibular hollow of the Snow Geese. When this hybrid is bred back with the pure Snow, a white goose is produced that can be

told from the pure Snow Goose, only by the very slightly smaller size.

The only successful method of hybridizing is by confining a selected pair of geese together in a paddock. In the majority of cases the birds refuse to mate.

Black Ducks are kept in a paddock of about four acres containing a fresh water pond well supplied with lettuce and eel grass of which the birds are very fond. Tall grass, weeds and bushes are thick, and the birds breed usually among this low vegetation. During the present year seventy-five young Black Ducks were hatched, but every one was killed by a murder-our Egyptian gander. Black Ducks are wild in disposition, and will mate only in large paddocks.

The Snow Goose lays its eggs on the ground near the water, in an enclosed paddock, the eggs usually not being fertile. In 1900, however, four young Snow Geese were half raised but were killed by dogs. The Common Brant Geese mate but never lay.

THE PONIES OF CHINCOTEAGUE.*

By LEE S. CRANDALL.

HINCOTEAGUE and Assateague Islands in Virginia each support a drove of ponies, numbering from fifty to one hundred individuals. They forage for themselves winter and summer, receiving no more care than the wild mustangs of the West.

Tradition has it that these semi-wild ponies are the descendents of Spanish horses, which came ashore from a foundered galleon. This seems a reasonable explanation, and is generally accepted.

In general appearance the ponies closely resemble mustangs, to which they are undoubtedly related. Rarely exceeding fourteen hands in height, they are thick and stocky, with the smallest of ears and hooves. The manes and tails are extremely long in typical specimens, and many of the little animals are very handsome. In winter, of course, their coats are

rough and shaggy, but in summer they are as smooth and sleek as satin. All of the self colors known among the mustangs are found among the eastern animals, buckskins and even creams being common. Calicoes, pintos, and other pied forms are, however, never found among them, stockings and blazes being the extreme of white markings.

In temperament, on the other hand, they are the perfect antitheses of their western cousins. Gentle and kind, they make splendid saddle ponies, and the savage bucking of the mustangs is absolutely unknown among them. Many are broken for driving, and are safe and reliable, thus differing radically from the western ponies, which are notoriously unruly in harness.

They are prolific breeders (continued inbreeding has apparently not decreased their vigor), and each mare has a colt at her side. Each fall a roundup is held, when all of the colts are caught and branded.

When surrounded, and no avenue of escape presents itself, the ponies at once commence to "mill" after the fashion of mustangs and cattle, working around the circumference of a circle, with the colts inside.

The herds are, in each case, led by a splendid stallion, who has complete command. At various times, as the young stallions increase in age and weight, they challenge the leader to battle for his position. Many vicious combats result, which are often of long duration. Rearing on their hind legs, wrestling for an opening like skilful boxers, biting, striking and squealing, they will at times whirl from the top of a ridge into the surf, and out into the sea, often to the level of their backs. The old leaders are rarely overcome until weakened by age, because they have gained strength and experience from years of warfare, and the younger animals are usually no match for them.

These little animals range free over the two islands, feeding on the succulent young grass in summer, and getting a scantier livelihood from the dried blades through the winter months. When the mosquitoes and horse flies become unbearable, the herds stand leg deep in the surf.

The native owners guard their animals with jealous pride, never introducing new blood for fear of "spoiling the breed." The ponies are in great demand both on the island and the mainland, and a very profitable traffic has been built up.

^{*}Mr. Crandall recently made a trip to Chincoteague Island, Virginia, in the interests of the Zoological Society, and while there gathered the following information concerning the semi-wild horses found in that region. The facts are of decided interest and well warrant publication.

WILD BIRDS BRED IN CAPTIVITY IN THE EASTERN UNITED STATES.

(7	AT	TI	FC	T	31	FS

Globose Curassow	Crax globicera	Gould.
	Bonasa umbellus	
	. Tragopan caboti	
Impeyan Pheasant	Lophophorus impeyanus	Little.
Manchurian Eared Pheasant	Crossoptilum manchuricum	Little.
Black-crested Nepal Pheasant	Gennaeus leucomelanus	N. Y. Zool, Park.
Melanotus Pheasant	" melanotus	Kuser.
Anderson Pheasant	" andersoni	N. Y. Zool, Park.
Lineated Pheasant	" lineatus	Little.
Silver Pheasant	. "nycthemerus	N. Y. Zool, Park.
Swinhoe Pheasant	winhoei	Kuser.
English Pheasant	Phasianus colchicus	N. Y. Zool, Park.
White Pheasant	" rar. " torquatus " rersicolor	N. Y. Zool, Park.
Ring-necked Pheasant	" torquatus	. N. Y. Zool, Park.
Versicolor Pheasant	" rersicolor	, Kuser,
Reeves Pheasant	Surmaticus recresi	N Y Zool Park
Golden Pheasant	Chrysolophus pictus amherstiae	N. Y. Zool, Park.
Lady Amherst Pheasant	" " amherstiae	N. Y. Zool. Park.
Red Jungle Fowl	(iallus aallus	N. Y. Zool, Park.
Indian Peafowl	Paro cristatus	N. Y. Zool. Park.
Black-winged Peafowl	" nigripennis	, N. Y. Zool, Park.
Wild Guinea Fowl	Numida meleagris	N. Y. Zool. Park.
Wild Turkey	Melagris gallopavo silvestris	N. Y. Zool. Park.
	Oreortyx pictus plumiferus	
California Quail.	Lophortyx californicus	N. Y. Zool, Park.
Bob-white		. Hodge.

COLUMBIFORMES

White-backed Pigeon	Whitman.
Rock Dove " livia	N. Y. Zool, Park.
Stock Dove " oenas	Whitman,
Triangular-spotted Pigeon " guinea	Whitman,
Bare-eved Pigeon " gymnoptha	lmaWhitman.
	Whitman,
	aWhitman,
Defens Disson " vufna	Whitman,
Band-tailed Pigeon " fasciata	Whitman.
Wood Pigeon " palumbus	Whitman,
Passenger Pigeon	us
Mourning Dove Zenaidura macroura	carolinensisWorthington.
Venezuela Dove Zenaida vinaceo-ruf	a Whitman,
White-winged Dove	t
European Turtle Dove Turtur turtur	N. Y. Zool, Park.
Oriental Turtle Dove " orientalis	
Barbary Turtle Dove	N. Y. Zool, Park.
White Turtle Dove " " "	varWhitman.
White Turtle Dove	ensisWhitman.
Indian Turtle Dove " dourac	aWhitman,
Dwarf Turtle Dove Onopopelia humilis .	Whitman.
Chinese Turtle Days	Whitman
Tigrine Turtle Dove " tigrina	Whitman.
Senegal Turtle Dove Stigmatopelia seneg	alensis N. Y. Zool, Park.
Tigrine Turtle Dove 'tigrina Senegal Turtle Dove Stigmatopelia seneg Barred-shouldered Dove Geopelia humeralis	Thompson.
Peaceful Dove	Whitman.
Barred Dove " striata	Whitman.
Graceful Ground Dove " cuneata	Thompson.
Inca DoveScardafella inca	w nitman.
Northern Ground Dove	naWhitman,
Talpacoti Ground Dove "talpaco	otiWhitman.
Bronze-winged Pigeon	Whitman.
Australian Crested PigeonOcyphaps lophotes	Kuser.
White-fronted Dove Leptontila fulvivent	ris brachypteraWhitman.
Reichenbach Dove " reichenbach	ichiWhitman.
Wonga-wonga Pigeon Leucosarcia picata	Whitman.

LARIFORMES

Gruiformes		
Demoiselle Crane		Kuser.
Ardeiformes		
White Ibis		N. Y. Zool, Park.
Black-crowned Night Heron	Nycticorax nycticorax naevius	Nat'l Zool. Park.
Anseriformes		
Whooping Swan	Cygnus cygnus	Whealton.
Mute Swan	Ölör Chenopsis atrata	Nat'l Zool, Park.
Wood Duck	Chenopsis atrata Lir spoussa " galericulata Chen hyperborea nivalis Luser fabilis Branta canadensis Casarca casarca Luss platyrhynchos " obseura	X. Y. Zool, Park
Mandarin Duck	" galericulata	Cox,
Greater Snow Goose	Chen hyperborea nivalis	Whealton.
Canada Goose	Branta canadensis	N. Y. Zool, Park.
Ruddy Shelldrake		Browning.
Black Duck		N. Y. Zool, Park.
Australian Gray Duck		. Kuser.
Gadwall	Chaulelasmus strepera	. Hudson.
Green-wing Teal	Nettion carolinensis	Cox.
Blue-wing Teal	Nettion carolinensis	Cox.
Pintail Duck	Dafila acuta	Cox.
Shoveller Duck	Spatula clypeata	Cox.
Red-head Duck	Lythya americana	Gallatin,
Ludian Spotted-hill Duck	Aythya americana	Lawrence.
	i ottorette potettornytt htt	Ganatin.
Pelecaniformes		
Florida Cormorant	Phalacrocorax dilophus	Nat'l Zool. Park.
Accipitriformes		
Bald Eagle	Haliwetus leucocephalus	Buff, Zool, Gdn,
PSITTACIFORMES		
Cockateel	Calonsittacus novae-hollandiae	Browning
Carolina Parrakeet	. Conuropsis carolinensis	Phila. Zool. Gdn.
Grass Parrakeet	Calopsittacus novae-hollandiae. Contropsis carolinensis. Melopsittacus undulatus. 	N. Y. Zool, Park.
	1 gapornis personata	I nompson.
Passeriformes		
MIMIDAE		
Cathird	Mimus gilvus rostratus	N. Y. Zool, Park.
	1,000	
TURDIDAE		
American Robin	" migratorius	N. Y. Zool, Park.
Wood Thrush	Hylocichla mustelina	N. Y. Zool, Park.
Rock Thrush	Planesticus tristis migratorius Hylocichla musteliua Monticola savatilis. Sialia sialis	Worthington.
Diffeored	Suttle statis	N. 1. Zoot, Park,
SITTIDAE		
White-breasted Nuthatch	Sitta carolinensis	.Worthington.
FRINGILLIDAE		
Rose-breasted Grosbeak	Zamelodia Indoviciana	N. Y. Zool, Park.
Saffron Einch	Sucalis d'areola	Thompson
Song Sparrow		Worthington,
PIOCEIDAE		
Cut-throat Finch		Thompson.
Zebra Finch	Taeniopygia castanotis	Browning, Worthington
Black-headed Mannikin Gray Java Sparrow	" orgzirora	Worthington, N. Y. Zool, Park.



BALD EAGLES 65 DAYS OLD, TWO HOURS AFTER LEAVING NEST. Hatched April 18, 1909, at the Zoological Garden, Buffalo, N. Y.

The list of authorities are the ones which, as far as I can ascertain, were the first to breed the species mentioned. The full names and localities are as follows:

Browning, Wm. H.—Rye, New York.

Buffalo Zoological Garden-Dr. F. A. Crandall, Jr.

Cox, John A.—Fieldstone Farm, East Brewster, Mass.

Gallatin, Frederic-Noroton, Conn.

Gould, Aviary of Howard-Mallory in charge -Port Washington, L. I.

Hodge, C. F.-Worcester, Mass.

Hudson, Percy K .- East Norwich, Long Island.

Kuser, Col. Anthony R.—Bernardsville, N. J. Lawrence, W. B.—Flushing, Long Island. Little, Dr. Geo. W .- Glens Falls, N. Y.

National Zoological Park-Frank Baker, Director-Washington, D. C.

New York Zoological Park-W. T. Hornaday, Director.

Philadelphia Zoological Park—A. I. Brown, Director.

Thompson, Aviaries of Mrs. F. F.—E. A. Watts in charge—Canandaigua, N. Y.

Whealton, J. W.—Chincoteague, Virginia. Whitman, C. O.—Chicago, Ills.

Worthington, Aviaries of C. C.-C. W. Miller in charge.

It is hoped that anyone who has bred species of birds not on this list will send their records with full data to the Editor of this department.

I have recently compiled the above tentative list of the species of wild birds which have been bred in captivity in the Eastern United States. It numbers 109 species, and this will doubtless be doubled or trebled when many persons who have not as yet replied to my inquiries, have sent in their reports. The list, meagre as it is, includes some interesting species and several are worthy of more detailed mention.

European Herring Gulls.—The European Herring Gulls formed a successful breeding colony in the New York Zoological Park several years ago until they were exterminated by wild minks which came down the Bronx River, thus carrying their depredations into the very heart of New York City. The mink danger has now been overcome and a new lot of young gulls has been obtained from Lake Champlain, through the kindness of Mr. Edward Hatch, for the purpose of re-establishing the colony.

Bald Eagle.—The breeding of the Bald EAGLE in captivity in the Buffalo Zoological Gardens is, I believe, the first and only record. Dr. F. A. Crandall, Jr., has kindly furnished the following data and photograph of the young eagles:

"The mother bird was caught in Georgian Bay, Canada, in 1898. The father was brought from Alaska in 1903. Both birds were between two and three years old when received.'

"The female has had three mates, the first for two seasons, and one each for the last two years. She has laid four clutches of eggs, the first two

of which were not fertile. The eggs laid when paired with the second male proved good, and they were within one day of hatching when ac-

cidentally destroyed by freezing."

"The last mate she chose was the Alaskan bird above described. Two eggs were laid, and on the third day incubation began. They hatched just thirty-one days later on April 18th, 1909. The young eagles left the nest when sixty-five days old and were then in general appearance larger than the father."

Carolina Parrakeets.—The Carolina Parrakeet was bred in the Philadelphia Zoological Garden on September 9th, 1885, when one bird was hatched from an egg which had been placed under a Turtle Dove. The period of incuba-

tion was fourteen days.

Curacao Mockingbirds.—The Curacao Mockingbirds rear one or two broods year after year in a cage only four by five, by eight feet high in the New York Zoological Park. Thousands of people pass daily within six feet of the nest whout disturbing the sitting bird, or causing the male to interrupt his singing, which he continues long after his mate has begun incubation.

Avicultural Magazine.—The best advice to anyone who is contemplating keeping an aviary of living birds is to subscribe to The Avicultural Magazine. This very interesting monthly is published in England at \$2.50 a year, and the officer who receives subscriptions is Mr. T. H. Newman, Harrowdene Road, Wembly, Middlesex.

In the far west of our own country, bird lovers may join the Avicultural Society of California, the official organ of which is BIRD NEWS, a modest but promising bi-monthly with a sub-

scription price of 75c. a year.

Interest in living birds is rapidly increasing in our country and, as has been well proven in England, there is no better way of arousing a wholesome, humane love of wild birds among the people than by encouraging the keeping of live birds. With roomy cages and suitable food they become tame, sing, play, nest freely and are as happy when well cared for as their brethren in the woods and fields.

EXPERIMENTAL ACCLIMATIZATION.

I.—American Robins in England.

A successful is the introduction of the American Robin (Planesticus migratorius) into England. Late in December of last year Lord Northcliffe took back eighteen American Robins which we secured for him, and all but one of their number reached their English home in

safety. Late in March these birds began to build nests and lay eggs, but all were confined in the same enclosure, and the constant rivalry and fighting resulted in many casualties. So the eggs were removed as soon as laid and placed in the nests of Thrushes and European Blackbirds who did well as foster parents, and successfully reared twenty-four young "Yankee" Robins.

About the middle of June all the robins, old and young, were liberated on Lord Northelife's estate and at last report they were doing well; a number of nests had been made and young birds reared in the open, and but little propen-

sity to stray was evinced.

The crucial point of the experiment will come at the time of migration. Considering how many of our Robins winter with us in sheltered places it is not impossible that those in England may be contented to remain more or less sedentary throughout the winter, especially as the English winter is so much milder than ours. If the birds should migrate and any can be located in their winter quarters, valuable data may result, in showing whether present geographical conditions, or the mere accompanying of other migrant birds, will influence their choice of direction. Such an experiment in the southern hemisphere would be even more valuable in this respect.

II.—Birds of Paradise in Trinidad.

Sir William Ingram sent an expedition last spring to the Aru Islands near New Guinea in search of live birds. Among other interesting species, fifty Greater Birds of Paradise (Paradisea apoda) were obtained which are now being prepared för shipment to our hemisphere. They will be liberated on the estates of Sir William Ingram in the Island of Trinidad, off the northeast coast of South America. The outcome of this attempt at the acclimatization of such rarely beautiful birds in a region so remote from their native haunts will be of the greatest interest.

III.—Mockingbirds and Cardinals Near New York.

An extensive attempt will soon be made by the writer to introduce Mockingbirds and Cardinals—or rather to reintroduce them—in the New York Zoological Park and at Bernardsville, New Jersey. The birds will be confined in large flight cages and liberated in the spring after they have become accustomed to their new surroundings and have shown signs of pairing off. Several Mockingbirds which have been set at liberty in the Zoological Park have made themselves completely at home for several

months, and one individual has lived in the Botanical Garden and the Zoological Park during the past two years, summer and winter,—finding its own food.

The Cardinal is common in Central Park but almost unknown in the surrounding country, and Chapman records the Mockingbird as breeding for several years in succession at Tenafly, New Jersey.

WHOLESALE REARING OF PHEASANTS.

THE rearing of game-birds for the stocking of preserves and for the beauty which their splendid plumage adds to wood and meadow of country estates is an industry which is rapidly growing and, from an economic standpoint, becoming of more and more importance. The Department of Agriculture will soon publish a Bulletin devoted to Pheasant Propagation, and from many states pamphlets and reports are constantly being received, showing how widespread is the interest.

In New York State a farm of two hundred acres near Sherburne has been acquired by the State Game Commission for the purpose of propagating game birds. Mr. H. T. Rogers, a practical game-keeper, is in charge and informs us that five hundred pairs of pheasants have already been purchased, it being the intention of Commissioner Whipple to send out, in the spring of 1910, several thousand young birds and if possible fifteen thousand eggs.* These eggs will be sent to farmers with a printed circular from the Game Commission giving explicit directions as to hatching the eggs under a fowl and caring for the young Pheasants afterwards. In this way it is hoped to introduce the Pheasant broadcast over the state, gaining thereby not only the addition of a beautiful bird to our coverts (now left so vacant by the depletion of Grouse, Bob-white and Woodcock), but also a splendid game-bird, and in addition valuable to the farmer in feeding on injurious insects.

This is the first state work of the kind taken up in New York, but there are scores of private estates where Pheasants are bred and the statement that "tens of thousands of English Pheasants are reared every season on Long Island, in New Jersey and New York" is probably not exaggerated.

Mr. Bayard Thayer writes me from Lancaster, Mass., concerning Pheasants. "I raised this year about twelve hundred and have stocked the

⁴A record was kept several years ago by Mr. Rogers of one hundred pheasant hens. During three months, April, May and June, they showed a yield of 1637 eggs, of which 80 to 90 per cent, hatched. country about here for ten miles from the overflow, as I never shoot my coverts very hard."

The most successful introduction of Pheasants in the United States has been in the northwest, where in Washington and Oregon there are great numbers of Ring-necked, Golden and Silver. The abundance of these birds may be gauged from the fact that on the first open day of hunting in one of those states, more than fifty thousand Pheasants were bagged.

To those of us who are interested in Pheasants from an aesthetic rather than a gastronomic standpoint, there remain the most wonderfully colored of all—the Impeyans, Tragopans and many others which are not prolific breeders, and whose beauty will not therefore become bloodbespattered bunches of feathers in the bag of every man who can own a gun.

It is a great pity that our native game-birds are so difficult to hatch and rear in captivity that they will probably never be able to compete with their more prolific and adaptable Asiatic cousins.

MY AVIARY AND ITS INMATES.

By WILLIAM H. BROWNING.

Member of the New York Zoological Society and of the Avicultural Society of England.

N England the keeping of foreign birds in aviaries has long been practiced, as one can judge from the membership of the Avicultural Societies of that country.

In America the private aviary is rapidly becoming popular, and with reason, for it is a hobby out of which those who are naturally fond of birds can get a lot of genuine pleasure.

Most people are fond of the singing of birds, and a well-selected aviary is a musical song box. Some admire birds for their plumage, while others make the experiment from a scientific interest in the breeding and rearing of rare foreign species. In a well-constructed aviary, the birds are perfectly happy.

My aviary, on my estate at Rye, New York, close to the waters of the Sound, is about fifty feet long by twelve in width. It is built of wood somewhat in old Dutch style. It faces south and the north side is placed as close as we could get it to some large elm trees which overshadow the roof, so that when the sun is high in summer, it is not too hot inside. The south side is glass for about seven feet from the ground, so that a sun parlor is available in winter.

Inside the house is a passageway about four feet wide which runs straight through from end to end. From this the flights—and there are ten of them—are divided off by ordinary § wire.

The flights resemble stalls, each being 5 ft. x 8 ft. x 12 ft. high. They are divided with wood up to a height of about seven feet, and from there to the roof the $\frac{3}{8}$ wire is used. The wood is set in a slot like the door of a coal bin, so that two flights can be easily made into one if it should be found desirable.

I used \(^3\) wire as mice cannot get through it and they can get through \(^1\)-inch wire. In each flight there is a door. It is purposely made low—about \(^1\)-\(^1\)-\(^1\) tin height—and at the side of the door is a box jutting out about eight inches into the passageway. It is 2' 6" high by 4' 6" long, divided by a board in the middle, so that the same box runs from one flight to the one adjoining. The cover is hinged and divided in two, and by raising these covers the food can be placed in the flights without opening the doors.

I have found this arrangement very satisfactory. If I had it to do over, the only improvement I could suggest would be to make a metal tray, like the tray of a bird cage, at the bottom

of each box.

There is a one-inch water-pipe running lengthwise through the middle of the flights, and in the centre of each flight is a tee from which a one-half-inch pipe comes up through the floor to a height of about four inches. The top of this short half-inch connection is threaded, and after it had been slit with a hack saw, I serewed on each one an ordinary half-inch cap. I found that I could adjust the flow of water by the distance I screwed the cap down, and that the spray was forced directly downward.

Another hole was made through the floor, close to the inlet, and a one-inch coupling set flush with the bottom of the basin. In this a short piece of pipe about two and a half inches long is screwed loosely. If it is removed, all the water washes away and if left in, it will not rise above its level.

My basins are made of concrete. I had a plumber make two galvanized iron hoops for a mould—the larger about 1'8" in diameter by 5 inches high, and the smaller 1'6" in diameter by 4 inches wide. By setting the smaller inside the larger, and raising the inside one, one inch from the floor, it is easy to see how each basin was made.

The cost of the twenty basins—for there are ten in the outside flights besides the ten inside—was about twenty dollars.

On the outside I used brass pipe and a brass cap for the short connection, and there is no waste, the water overflowing on the sand.

One 10 x 10 pane in the lower sash, which raises outward and hooks back, is used as a door.

This gives access to the outdoor flights which are in dimensions 5 x 8 ft. by the height of the roof, which is hipped with about 2 ft. overhang. giving a little shelter up close to the house. The rest outside is a wooden frame covered with the 3 wire. The house is ceiled inside and painted white with cold water paint. basins are enameled white. The outside wire is painted black and the frame black. The roof is shingled and stained black. From the eaves downward white boards are placed upright with round moulding over the seams for a distance of about 5 ft. from the ground, where a white round moulding runs around three sides of the house, and below this are old-fashioned long split shingles.

The house is heated by four 3-inch water pipes running low against the north wall and so arranged that they can be used in pairs or not, as necessary.

I planned the interior and let the Architect, Mr. Oscar Blumner, frame around it as artistically as he could. The cost of the house was about nine hundred dollars. If I had it to rebuild, the only improvements I would make would be to ceil it inside with hardwood and use wire glass and metal sash on the windows, as the destructive bills of some of the cockatoos keep me busy patching it up.

I do not like a concrete house for birds. It might do in some places but it is too damp with us close to the water. It would be all right in the winter, when the heat is on, but in the spring and fall the birds would suffer. We keep the place comparatively cool. In the winter the temperature ranges from 50 to 60, and even if it gets below that it never seems to inconvenience the birds.

In winter I could not take a newly purchased bird which had probably been kept in a much warmer temperature, and turn him out suddenly in so cool a place, but birds that have been acclimated are all the better for the low temperature.

The most essential thing for the birds is fresh air, and I allow them the outdoor flights from about the 10th of May to the last of October.

I feed the seed-eating birds on canary seed, hemp and sunflower and more or less dried wheaten bread, which I purchase by the quantity for chickens at \$1.75 per 100 lbs. They also have green food from the garden. The insect eaters are fed on ordinary mockingbird food, Abraham's preserved yolk of egg which I am obliged to import, and minced raw meat. I presume the total feed bill would average close to \$10 per month.



FRONT VIEW OF AVIARY.

My gardener looks after the aviary and I have no regular keeper. My principal losses have been due to placing the wrong kinds of birds together, resulting in their killing each other, particularly at breeding time; and to overeating and consequent fatty degeneration; while a few are occasionally lost from injuries caused by striking their heads when frightened, particularly at night. On the whole, however, the losses are no greater than with chickens or any other domestic fowls.

Now, as regards the inmates, in the first flight there are, at present, three Cockateels (these nest readily in confinement), a pair of Crimsonwinged and a female Red-rump Parrakeet, besides three Green Love-birds. In the second: Dominican Cardinals, Java Sparrows and a few Canaries. In the third: a pair of Leadbeater Cockatoos. In the fourth: Zebra Finches. Manikins, Weaver birds and a lot of other small Finches. The Zebra Finches have bred so

abundantly that they outnumber the others three to one.

In the fifth: Budgerigers, or Australian Grass Parrakeets, of which I have bred a large number. For breeding places, I first used co-coanut husks, imported from E. W. Harper, Wolverhampton, England, and latterly have been using the No. B logs made by Mr. Herman Scheid, Buren i. Westfalen, Germany, which can be imported for about 50c. apiece.

In the sixth flight there are a pair of Blue Mountain

Lories, two Green Cardinals, an Indian Shama, and a lot of other small birds. The Blue Mountain Lories are spiteful with other parrots but they do not seem to pay much attention to the smaller birds.

In the seventh: A pair of Rosellas and a male Ringneck Parrakect. I had two pairs of Rosellas, but this spring one of the cocks killed the other pair, and although the surviving hen laid eggs she did not hatch them.

In the eighth is a pair of Minors, a Malabar Minor, a

Green Barbet, a pair of Starlings, a Rose-Colored Paster, another Shama, a Mexican Solitaire (a very fine singer by the way) and an Indian Drongo. This last is supposed to be a very delicate bird, but he has now been in good health for over a year.

In the ninth: A Red-vented Parrot and a male New Guinea Green Electus. The New Guinea Electus is a stupid bird, but I purchased him with the intention of procuring a mate which up to the present I have been unable to do.

In the tenth: A pair of Pennants and a female Slaty-headed Parrakeet. I lost the male through what was apparently sun-stroke.

In conclusion let me say again that any one who is fond of birds will find the keeping of a private aviary such as I have described, a fascinating and inexpensive hobby, and that I shall be pleased to give any further advice I can on this subject to any one desiring it.



SIDE VIEW OF AVIARY.

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Ja. 39



DECENNIAL OF THE NEVV YORK ZOOLOGICAL PARK - MCMIX





MAP OF THE ZOOLOGICAL PARK.

WHITE-TAILED DEER HERD.

ZOOLOGICAL SOCIETY BULLETIN

DECENNIAL NUMBER

Number 37

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January, 1910

HISTORY OF THE ZOOLOGICAL SOCIETY

By MADISON GRANT Secretary of the Society

N the Fall of 1894 important political changes occurred in the City of New York, which gave promise of a new era of municipal improvement. The Boone and Crockett Club, an organization of sportsmen, with Theodore Roosevelt at its head, was at that time actively engaged in game protection and was devoting its energies to the enactment of suitable legislation, and the establishment of game refuges. The Club had played a large part in the foundation and organization of the Yellowstone National Park, and some of the members of the Club thought that the occasion was propitious for the establishment in New York of a Zoological Park along new and modern lines. The Zoological Gardens in Europe, and most of those in America, were in the centers of dense population, and were of necessity limited in extent to some thirty or forty acres. They were also dependent for their maintenance, to a large degree, upon admission fees. The new conception of a Zoological Park was radically different, and called for a large area on the outskirts, rather than the center of the city, sufficient in extent to provide natural surroundings for its inhabitants, while not being so vast as to preclude visitors from enjoying the rare spectacle of animals in open-ranges.

A proposal to establish in New York a Zoological Park along these lines was brought to the attention of the Boone and Crockett Club by the writer, and he was immediately appointed chairman of a Committee to secure the necessary legislation, and organize a Zoological Society. The other two members of the Committee were Mr. C. Grant La Farge and Hon, Elihu Root. As soon as the Legislature convened at Albany, the Committee found that there had been introduced a bill which had apparently the same objects, as it provided for the establishment of a Zoological Garden on City lands north of 155th Street. The bill had been introduced several years in succession by Mr. Andrew H. Green, who had long been interested in the scientific institutions of New York. The bill had been repeatedly defeated, chiefly on account of a clause it contained authorizing the Park Board to turn over to the new Society, the menagerie at Central Park. The proposed removal of the Central Park menagerie, at that time in a most disreputable condition, provoked violent opposition. The Committee called on Mr. Green and discussed the matter with him, outlining the views of the Club in regard to a proposed Zoological Park. To all these views Mr. Green gave cordial acquiescence, and the Committee de-



SITE OF THE POLAR BEAR DEN.

cided to help pass the existing bill, rather than to introduce a new measure. Subsequent events, however, showed that it would have been much wiser to have started with an entirely new bill, instead of accepting the old one, as the original charter of the Zoological Society proved somewhat limited, and required subsequent amendments. It could be still further improved by enlarging the scope and purposes of the Society. In spite, however, of the somewhat cramped provisions of the bill, the Committee agreed to help Mr. Green in return for his assurance that his purposes were identical with those of the Club, and that the control of the new organization would be turned over to the Club.

The writer and Mr. C. Grant La Farge, the two active members of the Committee, thereupon interviewed Mr. William White Niles, Jr., then a member of Assembly, who had introduced the bill on behalf of Mr. Green, and who was seriously considering its withdrawal, owing to the various annoying charges made in connection with the proposed transfer of the

Central Park Menagerie. The Committee assured Mr. Niles that they not only had no intention or desire to secure the Zoological collection at the Menagerie, and would not, under any circumstances, accept the transfer of the animals in Central Park, or even the control of them.

Mr. Niles accepted the assurances of the Committee, and proceeded to push the bill to a successful passage. The bill was, however, first amended by adding the names of the writer and of Mr. C. Grant La Farge to the list of incorporators, and by cutting out the objectionable feature which had reference to the menagerie in Central Park.

The Committee thereupon interviewed the various opponents of the bill and satisfied them that their apprehensions as to the purposes of the proposed legislation were without founda-

Upon the enactment into law of Chapter 435 of the Laws of 1895, the New York Zoological Society held its first meeting for organization on May 7, 1895. Of those pres-



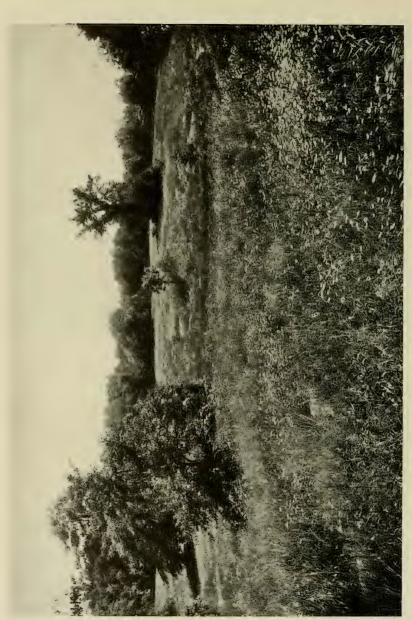
COMPLETED POLAR BEAR DEN.

ent at that meeting, only Mr. La Farge and the writer are at the present time in any way connected with the Society. The Board of Managers which was selected contained the names of nine members of the Boone and Crockett Club, Mr. Andrew H. Green was elected President, and Mr. Charles E. Whitehead and Mr. J. Hampton Robb, Vice-Presidents, and Mr. L. V. F. Randolph, Treasurer. The writer was elected Secretary, and has held that office continuously ever since. It was at this meeting that Professor Henry Fairfield Osborn's connection with the Society began, and his active interest in the welfare and development of the Society was the greatest element of strength that the Society possessed at that time, or which it has since acquired.

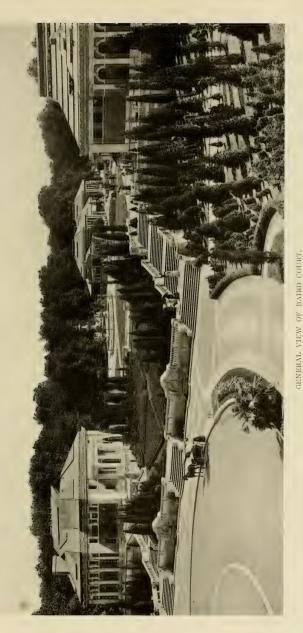
A year was then spent in the consideration of various schemes for carrying out the purposes which the Committee of the Boone and Crockett Club had in mind, and which have since been embodied in the Zoological Park. The personnel of the Board of Managers was gradually transformed by the addition, one by

one, of the men who have since carried on the Society's work and created the Park. Mr. Philip Schuyler, Mr. John L. Cadwalader, Mr. Samuel Thorne. Mr. Charles T. Barney and Mr. W. W. Niles, the sponsor of the original bill incorporating the Society, and an active helper from the beginning, joined the Board of Managers and Executive Committee at this time, and took active parts in the development of the Society and its work.

The consideration of sites involved a careful study of nearly every park area then in existence north of Central Park in Manhattan Island and in the Borough of the Bronx. Not much progress was made along these lines until on April first, 1896, when Mr. William T. Hornaday was engaged as Director of the Zoological Park. Mr. Hornaday had conceived, organized and developed the National Zoological Park at Washington, which, at that time, was the only Zoological Park in existence of anything like adequate size. Mr. Hornaday gave his first attention to a careful study of the various parks, and soon brought



Upon this site have been erected the Houses for Lions, Primates and Perching Birds, and the Administration Building. BAIRD HILL, LOOKING NORTH, NOW KNOWN AS BAIRD COURT.



Showing the Administration Building on the left, a portion of the Large Bird-House on the right. In the foreground, the Italian Garden, and the Primates House in the distance.



GRAND CONCOURSE, FROM THE ITALIAN GARDEN; LOOKING NORTH.

to the attention of the Committee the fact that the southern half of Bronx Park offered an ideal site for the proposed institution. The meadows, glades, forests, ponds and river areas were so distributed that buildings could be located and large ranges established thereon practically without injury to the existing landscape conditions, or the splendid forest trees. The larger part of the area thus selected had formerly formed part of the Lydig Estate, to which fact was due the exceptionally favorable forest conditions.

After a prolonged inquiry into the accessibility, drainage and topographical conditions of the Park, the Zoological Society, through its Executive Committee, approved this site, and on May 21st, 1896, formal application was made to the Commissioners of the Sinking Fund for the transfer of Bronx Park, south of Pelham Avenue, to the Zoological Society. At first the application was not favorably viewed by the City authorities, and it was only after a prolonged discussion, and some changes in the officers of the Society, that the Commissioners of the Sinking Fund gave the matter their final sanction, on March 24th, 1897.

A portion of this second year of the Society's existence had been devoted by Mr. Hornaday to a thorough study of the Zoologi-

cal Gardens of Europe, the results of which were embodied in a report to the Committee. Mr. Hornaday also prepared the general ground plan of the Zoological Park, out of which has developed, during the last ten years, the existing scheme of the Park. Modifications have been made in small matters, but on the whole the substantial manner in which Mr. Hornaday's original design has been found to meet actual conditions has proved his foresight in its preparation.

At this time, also, the active interest of Mr. Percy R. Pvne, in the affairs of the Society, began, and Mr. John S. Barnes, Mr. F. Augustus Schermerhorn, Mr. A. Newbold Morris, Mr. Andrew Carnegie and Mr. Morris K. Jesup, became members of the Board of Managers. Most important of all was the election to the Board of Managers and to the Presidency of the Society of the Hon. Levi P. Morton. The selection of Mr. Morton as the head of the Society was perhaps the determining factor in securing the favorable action of the Commissioners of the Sinking Fund, in giving to the Zoological Society the sole control and management of the proposed Zoological Park, under a contract which has proven a highly satisfactory working agreement between the Society and the City.

The members of the Commission of the

Sinking Fund voting in favor of this contract were Mayor William L. Strong, Comptroller Ashbel P. Fitch, City Chamberlain Anson G. McCook, and Recorder John W. Goff.

The chief feature of this contract of March 24th, 1897, was an agreement, on behalf of the City, to provide an adequate maintenance fund in return for free admission to the Zoological Park during at least five days of the week. This maintenance fund began with a grant of \$40,000, and was soon raised to \$65,000. It was not until 1903 that the amount of \$100,000 was reached. The amount for the year 1910 is \$167,632. The Society pays all maintenance bills and is reimbursed, from time to time, by the City, up to the amount allowed for that year. For several years the annual maintenance fund was inadequate, and there was an annual deficit, which had to be met by the Society. Later on, however, the sums allowed were increased until they proved sufficient, with the aid of extreme economy, to maintain the Park without encroachment on the funds of the Society. It is, however, to be regretted that the staff of officers at the Park are not better recompensed for their exceptionally valuable services. It seems to be one of the inequalities of our present civilization that our scientific men, whose brains are of the greatest value to the community, should receive mere pittances, in comparison to what crude labor receives, and quite absurd when compared with the enormous salaries paid to successful singers and actors.

The year 1897 was spent in developing the preliminary plans for the Zoological Park. All available expert opinion was obtained, and the plans were subjected to the closest scrutiny by the Committee. The final plan was adopted by the Executive Committee on November 15th, 1897, and immediately afterwards approved by the Park Board and Mayor Strong.

The Society then entered on its first serious effort to raise money, and for the next two years the energies of the Committee were largely directed towards the accumulation of a fund of \$250,000, upon the raising of which the whole scheme and the contract with the City was conditioned.

The City at that time provided its first appropriation for the improvement of Bronx Park, by a bond issue of \$125,000, which became law on May 8th, 1897. This was the first of a series of issues of bonds and corporate stock, the total amount of which, to the first of January, 1910, is \$1,900,000.

In 1800 the Zoological Society inaugurated improvement work by expending nearly \$250,-



SITE OF THE GRAND CONCOURSE BEFORE IMPROVEMENT.

Photographed from the same point of view as the picture on the preceding page.



PRIMATES HOUSE, BAIRD COURT, Showing the Rockefeller Fountain and the Sea-Lion Pool.

ooo of its own funds in the erection of the Reptile House, the Aquatic Bird-House, the Bear Dens. Flying Cage and about eighteen

smaller installations for animals.

As soon as the Park was thrown open the public was surprised, both by the magnitude of the plan and the permanence of all improvements. Then the City of New York cheerfully joined the Society in the remainder of the work. The Society was given absolute control of the Park, it furnished all plans, and virtually superintended all improvement work. The Park Department has stood in a position to safeguard all the interests of the taxpayers, and has awarded and superintended all large contracts for construction.

Throughout eleven years of active improvement business, involving nearly a hundred contracts, great and small, the business of financing and building the Zoological Park has gone steadily on, without a single halt or an unpleasant episode between the representatives of the City and the Society. In their turn, Mayors William L. Strong, Robert A. Van Wyck, Seth Low, and George B. McClellan, and Comptrollers Ashbel P. Fitch, Bird S. Coler, Edward M. Grout and Herman A. Metz, have cordially cooperated in the work. The Park Department of The Bronx has been most helpful, and we recall with particular pleasure the cooperation of the three longterm Commissioners, August Moebus, John E. Eustis and Joseph I. Berry, and their Chief Engineer and Chief Clerk, Martin Schenck and Gunther K. Ackermann.

The portion of Bronx Park turned over to the Society was in a condition of extreme neglect. Excepting the survey and map made by the Directors, no map of it existed. An open sewer ran through the grounds, bogs were numerous, and the condition of many fine trees was deplorable. The Society took hold of the forest barely in time to save these trees from destruction by fire, vandalism and decay.

Various extensions of the original tract have been secured by the Society from time to time, notably by the inclusion of an important block of land at 180th Street and Boston Road, which had been acquired by the Interborough Railroad Company for the purposes of railroad yards. The construction of yards of that sort, it is needless to say, would have destroyed that corner of the Park, as well as one of the most beautiful water-views in New York parks.

The Society experienced much trouble with propositions to despoil the Park in various

ways, and had a long struggle to prevent the construction of an elevated railroad structure through the center of the Park,

Another scheme, which was also defeated, proposed cutting off a wide strip along our western boundary to widen the Southern Boulevard. The demand for new entrances at various points, sometimes merely for the convenience of neighboring saloons, has been and still is continuous.

The straightening and widening of the Boston Road is threatened at intervals, but with the increasing strength and popularity of this Park the danger from these attacks grows less.

The location of the terminus of the Rapid Transit system at the village of West Farms, on the southern boundary of the Park, forced the Society to practically rearrange its original entrance plan, which had provided for a grand entrance from the north, through what is now the Concourse and Baird Court. As the City developed, new modes of approach became available, and the point of entrance of the largest crowds changed and will continue to change. The first visitors coming in numbers arrived through the entrance at the corner of Southern Boulevard and Pelham Avenue; but with the construction of the Interborough Railroad, the West Farms entrance became the favorite, and it may be that at some future date the Crotona entrance at the Southwest corner. being by far the nearest to the main center of the population, will become the chief point of approach.

The acquisition of a large tract of forest land on the east of our present boundary, by the Park Department, and the climination of the squalid little village of Bronxdale, will very probably result in a readjustment of our boundaries along the north and east. The Society is not anxious to assume any further responsibility for the care of additional land; but there is little doubt that all the land south of Pelham Avenue will be turned over to us by the City, and that as a matter of duty to the public, we will be obliged to protect and maintain it.

The Society assumed actual control of the Park on August 1, 1898. Work was immediately commenced on the Aquatic Bird-House and on the Elk House, and immediately after on the Reptile House and Bear Dens. On November 8th, 1899, the Park was opened to the public. At that time the Committee felt that the exhibit was a very expensive and elaborate one, but compared with the present



SITE OF THE BEAR DENS.

size of our collection, it now seems absurdly small, both in scope and in numbers.

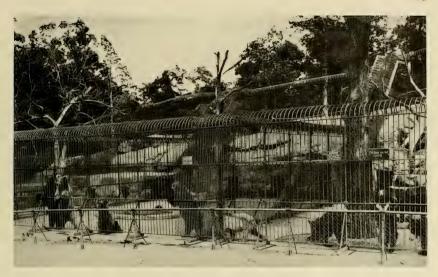
With the Park in full swing, the work of the Committee assumed large proportions in the study and development of the plans, with problems of engineering, architecture, landscape gardening and construction. Every detail was scrupulously studied, and the best available advice obtained. The first formulation of the scientific requirements and ground plans of buildings were prepared by the Director, passed on by the Executive Committee with the utmost care, and then turned over for construction to the architects of the Society, Messrs. Heins and La Farge, who have provided the Park with many beautiful specimens of exterior architecture. The Director also prepared a plan for the administrative force of the Park and rules of government, and recommended a staff of employees. The landscape features were submitted to and passed on from time to time by many different landscape architects, but the chief credit for the artistic development of details, for most of the planting plans, and for all the care of the forests, is due to the professional skill and unselfish devotion of the Chief Forester, Hermann W. Merkel, who joined the force of the Park in 1808.

On May 23, 1899, Mr. H. R. Mitchell was

made Chief Clerk and Disbursing officer, and took entire charge of the finances of the Park. In addition to these functions he has been highly successful in developing the privilege business of the Park, until the receipts therefrom are now nearly sufficient to maintain in numerical completeness the collections of animals at the Park.

The rapid and continuous development of the Zoological Park has been stated elsewhere, and is recorded at length in the various publications of the Society. It has taken ten years from the date of the opening of the Park, in November, 1899, until the present time, to bring it up to its present state of completion, and from now on the work of the Society will be directed more and more to scientific investigation in connection with the collections and the expansion of the work of the Society throughout other fields.

The first important step taken by the Society outside of building a Zoological Park was in the acceptance of the Aquarium, under the administration of Mayor Low. At that time the Aquarium had been managed by the Park Department, and was in the condition usual in scientific institutions that are subject to frequent changes of administration. The Society assumed control of this institution and asked Mr. Charles H. Townsend, of the United



PORTION OF THE COMPLETED BEAR DENS.

States Fisheries Bureau, to be the Director. The Society has now managed this institution for seven years, and has so transformed it that it is now the foremost institution of its kind in the world. The collections represent 3,027 living creatures, and show splendid health conditions. The attendance during these years has increased until the year 1909 it reached nearly four million visitors. It is probably the most popular educational institution, public or private, in the world, and it has an attendance that is greater than that of all the other public museums of New York together.

The chief need of the Zoological Society at the present time is not merely more members. but an endowment fund, the proceeds of which can be devoted to the general uses and purposes of the Society. Until such an endowment fund has been provided, the Society is not on safe ground. The relations of the Society with the administrations of various political complexion have been, almost without exception, very cordial, and there is every reason to believe that they will so continue, But it is possible that a political upheaval might occur which would result in strained relations between the Society and the City, and the Society would be seriously handicapped for lack of funds, if the City withheld, even for a short time, its annual financial support.

Aside from this serious consideration, there remains scientific work which must be provided for in connection with the Park collections. The vast amount of material, in both the Park and the Aquarium, is now only partly utilized. The Society proposes to build a Biological Laboratory at an early date, but it will be of little avail unless we have funds sufficient to provide a staff of scientists in connection therewith. As an example, important observations on the intelligence of anthropoid apes, which were begun in our Primates House, were stopped last year because we did not have the money necessary to continue them. Lack of funds prevented similar work at the Aquarium, where the Director made some most interesting studies on the color changes of fishes; but we were without funds sufficient to publish a series of colored plates showing the extraordinary phenomena connected therewith.

Many other incidents might be quoted showing the need of adequate and permanent sources of income. The Executive Committee have made many sacrifices, but of course, there are limits to the resources of individuals, and work of this kind must be put on a permanent and broad basis.

The officers of the Society, especially the Director of the Park and the Secretary have



LION HOUSE, BAIRD COURT.



PORTION OF THE HERD OF AMERICAN BISON, IN THE BREEDING CORRAL.

been extremely active in matters of game protection, and the game laws from Newfoundland to Alaska bear to-day the impress of the Society's work.

Much work has also been done in the matter of game refuges, and through its officers the Society has been instrumental in the establishment of the Wichita National Bison Range, which, with the Montana National Bison Range, on the Flathead Reservation, have secured for all times the continued existence of the American Bison. Similar refuges must be provided elsewhere, and when established must be stocked with native animals. The Society intends to take up the question of preventing the threatened destruction of our marine fauna. The whales, seals and sealions demand more legislative protection. There is no organization in existence capable of doing as effective work on a large scale as the Zoological Society; but all this work now halts for lack of funds. If money were provided on a large scale there is no reason why the Zoological Society could not take a leading part in the great conservation movement which is just beginning.

The Society has the confidence of its members, it has the confidence of the City authorities, and the confidence of the public at large; and it is only lack of funds which prevents a great and immediate expansion of its activeness and usefulness. It is interesting to note the tribute bestowed by the present administration of New York upon the efficiency of the management of the Society, in the fact that Mayor McClellan asked the Society to take the charge and control of the menagerie at Central Park. This the Society reluctantly declined to do, on the ground that no proper treatment of the menagerie could be made without practically rebuilding the institution at a cost which could be more effectively used for simi-

The foregoing is a brief review of what has been accomplished in ten years by a young Society devoting a large amount of time and energy to civic and scientific institutions. With the expenditure of a similar amount of enthusiasm, the next ten years can easily be made even more notable in achievements in other and larger spheres.



ITALIAN GARDEN, BAIRD COURT.

The structure on the right is the Large Bird-House, and in the distance, the Lion House.



BARBARY LION. "SULTAN."

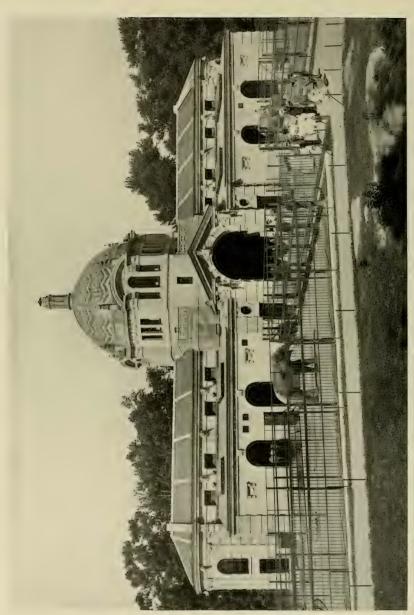
WILD ANIMAL CONTRIBUTIONS OF THE CONTINENTS

By IV. T. HORNADAY
Director of the Zoological Park

TO any person who is duly appreciative of the mammalian life of the world, the opportunity to bring together a series of collections that will represent it, is irresistibly attractive. To gather from the remotest corners of the earth a large number of strange and interesting animal forms, and render them available to the personal acquaintance of millions of knowledge-seeking people, is a task

both pleasing and interesting. After all has been said, the agents of commerce go no farther nor faster than do the pioneers of science; and they take no greater risks.

The gathering, transportation and exhibition of living animals is an industry in which trade and science must work hand in hand. The lines of every zoological society should literally go "out to the ends of the earth." At



ELEPHANT HOUSE AND ITS YARDS; NEAR THE SOUTHERN END OF BAIRD COURT; COMPLETED IN 1909.

this moment we are reaching out to British East Africa for Reticulated Giraffes, Gerenuks and Hartebeests; to British Columbia for the Inland White Bear; to Yakutat for the Glacier Bear; to the Mishmi Hills for the Takin, and to South America for the Maned Wolf, Giant Otter and Spectacled Bear. During the year 1909, we safely landed the Sable Antelope, Mountain Zebra, Greater Kudu and Musk-Ox; and we have every reason to hope that 1910 will be equally fruitful.

Through the force of inexorable conditions, the grouping of the collections in every well-regulated vivarium is based upon zoological classification. Manifestly, it is impracticable to arrange the beasts, birds and creeping things geographically; for such an arrangement would involve a duplication of buildings and other installations that would be almost endless. With 500 acres of land and water, and \$10,000,000 in available cash, such an arrangement would be possible; but the end would not justify the waste of means.

In previous publications we have reported upon our mammal collections as viewed by the zoologist and evolutionist, and now it may prove both novel and interesting to consider them faunistically, or, in plain English, as if grouped geographically, to represent the continents from whence they have been derived. Indeed, there are times when the general student of animal life finds it difficult to decide which arrangement of living forms is the more interesting,-the systematic-zoological, or that which represents continental faunas. In our National Collection of Heads and Horns we have cut this delightful knot by forming and exhibiting two series of the large land mammals of the world, one zoologically arranged, the other geographically.

In the stocking of a new zoological garden or park, the first principle to be observed is always the same: collect the animals that will make the greatest show of the local fauna (if there is one!) in the shortest time. It is natural that people should desire first of all to become well acquainted with the wild life of their own land. In obedience to this natural law, our first care in 1899 was to gather the greatest possible number of representatives of the fauna of the North American continent.

When we think of the contributions of the continents during the first decade of the Zoological Park, "the past rises before us like a dream." It requires no imagination whatever, nothing but fairly good memory, to call up before the mental vision six long processions of four-footed animals, slowly but steadily

wending their way to the woods of the Bronx that have been dedicated to zoology. It is not necessary to turn to printed or written records, for the memory is abundantly able to supply all the details of this bird's-eye view that the mind has time to consider.

The world has poured into the Zoological Park many of its richest zoological treasures, and all in order that the people of New York may know, by personal acquaintance, the best representatives of the vertebrate wild life of the globe. It is a great satisfaction to know, beyond a possibility of error, that the people of New York appreciate the effort that has been made for them here. During the year 1909, the attendance of visitors at the Zoological Park, by actual turnstile record, rose to 1,614,953,—a number equal to nearly one-half the population of the second city of the world.

Let us for this occasion depart from the strict routine of the zoologist, and view our small animal kingdom through the field-glass of the geographer. Let us imagine that we stand on the summit of a tall peak which might have existed on Fordham Heights, and view the contributions of the continents, in living quadrupeds for the Zoological Park, as actually made from 1800 to 1000, inclusive. It will add to the interest of the spectacle if we state here that of the 244 large or otherwise specially important species that without any book reference on our part will be mentioned in this review, exactly 191 are living in the Park to-day, and of the 53 that have disappeared, and have not yet been replaced, 25 are small forms. In our review of the species, those that to-day are missing will be printed in italics, to distinguish the quick from the dead; but it is to be remembered that we mention only the most prominent species, and many of those now missing will return. The total number of mammalian species now living in the Park is 254, and the grand total of individuals is

NORTH AMERICA.

The first large manimal to reach the new Zoological Park was a Woodland Caribou, from Champlain County, Canada. That was in the summer of 1899. It was quickly followed by a herd of Elk, and seven American Bison, purchased in Texas and Oklahoma and delivered at the Park by "Buffalo" Jones. Four years later, Mr. William C. Whitney presented to us his fine herd of 26 bison, and since that time the herd has so rapidly increased by breeding that 20 individuals have been withdrawn from it for bestowal else-

MALE SABLE ANTELOPE.

where. To-day our herd contains 36 head, and easily fulfils all requirements, both for exhibition and breeding.

Long before the opening of the Park, on November 9, 1899, we had assembled a herd of Prong-Horned Antelope from Colorado, several Moose from New Brunswick, Mule Deer from Colorado, Columbian Black-Tailed Deer from British Columbia and White-Tailed Deer from Maine. Notwithstanding the difficulties that others had found in acclimatizing Moose, Caribou, Mule Deer, Antelope and Big-Horn Sheep on the Atlantic Coast, we determined to put forth our utmost efforts with each of those species, and try by every means to overcome the well-known obstacles to their acclimatization here.

The Musk-Ox is represented by three specimens, one of which is now living. Our specimens of the Big-Horn Mountain Sheep came from British Columbia and Lower California, and represented two species; but neither of them elected to live long. The Prong-Horned Antelope herd has not been continuously maintained, for the average lifetime of individuals of that species in captivity on the Atlantic Coast is only eighteen months.

The flock of five Mountain Goats from British Columbia is maintained at its full numerical strength. Our herd of American Wapiti is thoroughly satisfactory. The Mule Deer, Columbian Black-Tailed Deer, White-Tailed Deer, and the Florida and Sinaloa White-Tailed Deer all have been successfully acclimatized in the Park, and all have bred here.

The Woodland Caribou of Canada, that in 1899 was the first large mammal species to arrive at the Park, was quickly followed by other Caribou, and enough Moose to constitute a herd. The struggle to acclimatize those two species on the Atlantic Coast has been long and continuous; but we believe that everyone who has attempted it has suffered defeat. The climatic conditions render it impossible for them to live south of Maine. On the other hand, the Peccary of Texas, is quite at home with us, and breeds freely.

In the procession of North American mammals, the carnivorous species are very numerous. First in importance comes a long series of bears, headed by five species of Alaska Brown Bears,—the Kadiak, Peninsula, Yakutat, Admiralty, and an undetermined species from north of the Arctic Circle. The magnificent monster, Ursus meriami, from the Alaska Peninsula, is the second largest bear in captivity, and beside it the largest Polar Bear

seems small. Our grizzlies have come from Mexico, Colorado, Wyoming, Yukon Territory and Alaska; and our all-too-numerous American Black Bears represent Mexico, Florida, Maine, New York, Wisconsin, Colorado and Alaska.

The Raccoon we have with us always.

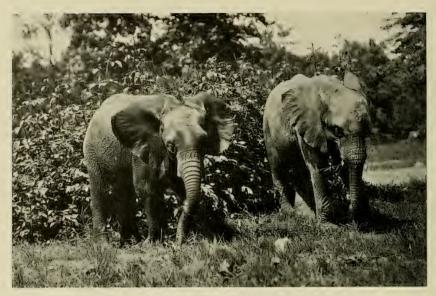
The odd *Cacomistle* and the White-Nosed Coati-Mundi from the Southwest always claim a share of our attention.

Of the feline carnivores, five important species rise to view, headed by the Jaguar and Colorado Puma, which are supported by the Ocelot and the rare and little known Yaguarundi Cat.

The leading genera of the Dog Family are well represented by a long series of the wolves and foxes in which North America is commandingly rich. At this moment, our group of North American Carnivores contains the Gray Wolf, the Northern Coyote, the Mearns' Coyote, the common Red Fox, the Black Fox, the Blue Fox, the Swift Fox, the Desert Fox, and the Gray Fox; and, until very recently, we have also shown the Cross Fox and Arctic Fox species.

Of the prominent fur-bearers belonging to the Marten Family, the species come and go, with rapid change. We know not what the experiences of other zological gardens and parks have been; but for ourselves, we can say that of all the small mammals, the members of the Marten Family are the most difficult to keep alive for long periods. It is very unfortunate that this is true; because at this moment thousands of enterprising Americans are calculating the possibilities of breeding fur-bearing animals in captivity, for profit. In their turn, we have exhibited here the Otter. Marten, Fisher, Mink, Black-Footed Ferret, Wolverine, Weasel and Skunk. Without a mental reservation we can say that the above species are the most thankless and disappointing of all the small mammals which we ever have kept in captivity. Although in their native haunts they are supposed to be exceptionally hardy and brave-spirited, in captivity and on exhibition, they have no stamina whatever, and are not long-lived. Their appetites are capricious, their digestive organs are easily upset, and their restless and fierce dispositions are conducive to early death.

It is to be observed, however, that we have dealt strictly with *exhibition animals*, and have not attempted to keep or to breed any of these fur-bearers *regardless of the necessity of hazing them seen by visitors!* It is quite to be expected that when these same species are kept



AFRICAN ELEPHANTS. KARTOUM AND SULTANA.

only for breeding purposes, and for their fur, without regard to their being seen, it will be possible to establish them in ways which will enable them to live much longer than when

forcibly kept on exhibition.

With the Pinnipedia, or fin-footed mammals of sea and shore, our experiences have been varied, and mostly unsatisfactory. The California Sea-Lion, which we have kept continuously on exhibition, lives through the winter successfully,—either outdoors or indoors,—but loves to die of pneumonia in April or May! The half-dozen Steller's Sca-Lions that we were at great pains to procure, because we hoped that species might prove more hardy than that of Southern California, were the most disappointing of all. All of them died within one year of their arrival at the Park, and in each case without just provocation.

The only Walrus that ever has entered the Park was that brought down by Commander Peary; but the long journey from the Arctic regions, and the almost insurmountable difficulties involved in providing it with proper food from the time of its capture to its arrival in New York, were more than it could endure. It survived only one week.

The Harbor Scals that were established in

the Wild Fowl Pond, before the fence around it was erected, refused to remain there, and insisted in journeying overland to the Bronx River,—evidently intending by following that stream to reach the sea.

North America is particularly well-stocked with animals representing the Order of Rodents, or Gnawers. The Squirrels, Chipmunks, Spermophiles and wild Mice and Rats form a vast legion. In the representation of this order, careful selection is necessary, in order that the most important genera may be represented, without too great an accumulation of species. Because of both its genius and its works, the Beaver is the North American rodent of most importance, and it should be the first to find a home in every well-regulated zoological park. In our Beaver Pond, the works of this remarkable animal are abundantly displayed; but the animal itself is rarely seen. Thus far we have found no way,--save confinement in a small cage,—which renders the Beaver available to view during the hours when it is most necessary that it should be seen. Because of the retiring nature of this animal during daylight hours, we maintain two exhibits,—one of Beavers in the Beaver Pond, where they are permitted to cut trees, build dams and build houses, at will. The other consists of Beavers maintained in the cages of the Small-Mammal House, and one of the Otter Pools, in such a manner that they can always be seen by visitors during daylight hours.

Muskrats, in a wild state, originally were so numerous in the Zoological Park that it was necessary to reduce their number. When kept in close confinement they fight fiercely, and as exhibition animals they are anything but satisfactory. As representatives of the respective groups to which they belong, we endeavor to maintain constantly in our collections the Canada Porcupine, Woodchuck, Prairie "Dog" and Pocket Gopher.

The rare and little known Sewellel from the Far West,—which is not nearly so well known in New York as the Okapi,—we have possessed and exhibited; but for exhibition purposes this species is not of commanding interest to the average visitor, and but poorly repays the effort that its presence involves.

The Squirrels are far more satisfactory; for, being full of the joy of life, they are constantly in evidence. Our best exhibit of Gray Squirrels is found, not in our squirrel cages, but running free in the Park, where scores of them daily go to and fro in the course of their regular work, to the constant entertainment of our visitors.

The Red Squirrels of the Zoological Park grounds became such an unbearable nuisance, in the destruction of birds' nests and young, and by threatening to drive out the Gray Squirrels, that we were obliged to reduce their number to a reasonable limit.

Our efforts to acclimatize the Fox Squirrel in the Zoological Park thus far have not met with success. The species does not enjoy occupying territory as a joint tenant with the Gray Squirrel and the Red. The Spermophiles that are so very destructive in certain portions of the West, we have been at some pains to represent here by some of the most destructive species.—Franklin's, Richardson's and the Thirteen-Lined Spermophile. In the Small-Mammal House there may always be seen several species of Chipmunks, that represent various localities between New York and California.

Our efforts to exhibit representatives of the Jack-Rabbit group have been unsatisfactory. Young animals do not mature well, and those which are caught adult and sent here despite their protests, nearly always brain themselves against the wire walls of their cages during the first fortnight after their arrival.

Within a short time we will exhibit a large series of wild Mice and Rats, the nucleus of which is already in hand, and will soon be placed on exhibition.

Both in species of mammals and in abundance of individuals, South America is poor to the verge of poverty. For a continent so great, so varied in topography and climate, and so rich in food for wild animals, her mammalian fauma is very meagre. The collector who goes to any portion of South America must work his heart out in order to secure even a fair showing of results. Take, for example, the Ungulates (hoofed animals), with which North America, Asia and Africa are so richly stocked. In comparison with the output of those three continents, the procession of cameloids and deer from South America is painfully small.

It is easy for any collector to secure all four of the cameloid species from the Andean region,—Llama, Alpaca, Guanaco and Vicunia,—and it is also easy to keep them alive. Strange to say, they are as quarrelsome as the worst of the carnivores, and to anyone not familiar with their habits in captivity, the fierceness of the combats between the adult males is almost beyond belief.

Of the very few species of deer found in South America, we have procured and exhibited the large Scvanp Deer and the small Pampas Deer; but in this latitude both are so delicate in captivity that it is impossible to keep them on hand continuously. Of all the South American mammals, the Tapir is the most satisfactory to exhibit in captivity. It is picturesque and interesting, it lives long, and it breeds in captivity with the utmost readiness and persistence.

Of the Carnivores, the Jaguar is by far the most conspicuous, and our large male specimen, called "Senor Lopez," has been in our possession for about eight years. The South American Puma, the Ocelot and the Coati-Mundi, are constantly on exhibition; but the little round-spotted Margay Cat is rare and intermittent. After ten years of continuous efforts, we have at last secured a bear from South America, representing the Andean Black Bear species, and a relative of the Spectacled Bear. Thus far, however, the Spectacled Bear has eluded our most strenuous efforts. The Crab-Eating Raccoon, Azara's Dog, the Patagonian Fox, and the Kinkajou, almost complete the list of our South American carnivores.

While the Rodents of South America are comparatively few in number of species, they



SNOW LEOPARD, OR OUNCE.

are exceedingly odd and interesting. The Capybara,—the largest of all living members of the Rodent Order.—looks like a tailless and specially amiable species of swine. The Viscacha we regard as one of our permanent residents; but the *Chinchilla* is intermittent, because it is so nearly extinct in a wild state.

The big Patagonian Cavy looks like an overgrown Jack-Rabbit, and both it and the Gray Cavy are exceedingly difficult to procure. The Paca, Agouti and Prehensile-Tailed Porcupine are much more common, and no large vivarium need be long without them. Perhaps the most interesting of all South America's odd mammals are the Edentates. This group contains the marvelous Great Anteater, the Tamandua, the Three-Toed Sloth, Hoffman's Sloth and the Six-Banded Armadillo,all of which, except the Great Anteater, we usually exhibit continuously. The latter, however, is so rarely obtained, and lives in captivity in the North for such short periods, that frequently it is absent from even the best collections. Of the few Marsupials of South America, the Murine Opossum is the one which most frequently reaches the North; but its representatives are so delicate they seldom

live long. Occasionally, one of these small creatures comes to us as a stowaway in a bunch of bananas, and does not appear until the liatches are taken off in New York.

The Patagonian Guemal and the few representatives of the White-Tailed Deer group that are found in northern South America, have not yet appeared in the Zoological Park.

EUROPE,

Owing to the well-nigh extermination of the important mammalian species that once inhabited Europe, it is not an easy matter to bring together any considerable number of European mammals. The acquisition of a living specimen of the European Bison is always a notable event. Our pair was three years in becoming fully acclimatized in New York. The Mouflon is a permanent resident, but the Spanish Ibex, Chamois and Maral Decr are all so rare that when a species is taken out by death it is difficult to replace. The Reindeer lives here as badly as the Caribou, and it is useless to waste effort upon it. The Red Deer and Fallow Deer are quite as much at home in New York as the best of our American deer, and breed persistently. The

Roebuck has not yet become as well settled here as the two preceding species, but within

a reasonable time it should do so.

Of our other mammals from Europe the most important are the Brown Bear, the Wolf, Otter, Red Squirrel, Marmot, Dormouse and Hedgehog. The Brown Bear breeds persistently, and the offspring of that species have become so numerous as to constitute a burden to the bear-keepers.

ASIA

The wild-animal procession from Asia is second only to that of Africa; and the size of it and the richness of it are positively thrilling. It contains whole groups that to-day are unrepresented in the mammalian fauna of North America, and whose absence is not entirely made good by the American genera that are unique. The Rocky Mountain Goat does not compensate us for the absence of the Elephant, the Rhinoceroses, the Ibexes, the Tahrs, the Tuhrs, the Takins and the Wild Horses, all of which are totally lacking here.

Our caravan from Asia is led by the Indian Elephant, the great Indian Rhinoceros and the Sumatran Rhinoccros. Fortunate indeed is the zoological institution that can number among its treasures the Indian "Rhino," one of the greatest zoological wonders left alive upon this earth. Our specimen, now about one-third grown, is in fine health, (though blind), and is growing rapidly. Our Sumatran Rhinoccros came to us so far in advance of the making of suitable quarters for it, it was found desirable to sell it. With its price we paid for the pair of Nubian Giraffes that for six years have formed the central and most commanding figures of the Antelope House,—always in perfect health, and appreciated by millions of visitors.

The Malay Tapir, half black and half white, follows closely after the Rhinoceroses, and behind it, separated by a zoological chasm, stalks with stately tread and (usually) serene temper, the big, hairy, double-humped Bactrian Camel. With this species, and the cameloids, we have been content without the Dromedary.

Of the wild equines of Asia we have three important species: the Prejevalsky Horse (breeding here), the Kiang of Tibet and the Persian Wild Ass.



SOUTH AMERICAN TAPIR AND YOUNG BORN IN THE PARK.



HERD OF AMERICAN WAPITI ON ITS RANGE.

Asia is particularly rich in species of Ibex and Mountain Sheep; but unfortunately the largest and finest species are nearly as difficult to acclimatize and keep in captivity for any length of time as is our Prong-horned Antelope. Nevertheless, the Siberian Ibex and the Persian Ibex have been exhibited in the Park, and the latter species is thriving here to-day.

The long-haired, wind-blown Tahr of the Himalayas is the hardiest of all the mountain animals of Asia that we have attempted to acclimatize. It is so well established here and breeds so successfully that our herd now contains nine individuals. The *Burrhel*, most beautiful of all the small mountain sheep, has inhabited the Park intermittently; but the Arcal Sheep has been with us always, and breeds here successfully.

Of the Asiatic antelopes, we possess the rare and beautiful snow-white Beatrix from the Arabian Desert, the very large but well-nigh hornless Nilgai of India, the beautiful little Doreas Gazelle of Arabia, and the Indian Gazelle of the plains of northern India. Very satisfactory, indeed, are the round-horned deer of Asia, with which we are well provided. Of the Wapiti group we possess the Hangul, the Tashkent Wapiti, and the Altai Wapiti, and all three are breeding here. The Malay Sambar and Indian Sambar both breed so successfully that the increase has become positively burdensome. The same may be said of the

The Axis Deer, most beautiful and satisfactory of all deer to keep in captivity, comes the nearest to a cervine fixture of any species we have attempted to keep. The Molucca Deer, Hog Deer, Muntjac, Japanese Sika and Chinese Water Deer, all are permanent except the last-named, of which we have had only one specimen.

Barasingha and the very rare Burmese Thameng, both of which are represented in the

Park to the point of embarrassment.

Of the many Carnivores of Asia, the Snow Leopard is the rarest of the larger forms, and also the most beautiful. Excepting at brief intervals, this species has been constantly an inhabitant of the Park, and the same may be said of the rare and beautiful Clouded Leopard.

The Tiger, the Common Leopard and the Manchurian Leopard are permanent residents; but the *Chectah* is intermittent; and of the rare and beautiful *Golden Cat* we have had only one specimen.

Most persistent of all Carnivores in captivity are the members of the Civet-Cat Family (Viverridae), in species of which we have long been richly provided. There is time to mention only the White-Whiskered Paradoxure, which has been here ever since the Park was first opened to the public; the Malay Civet-Cat and the Binturong; but the group, as a whole, to-day contains about eight other species.

Next to North America, Asia is the continent best supplied with bears, and from its fauna we constantly exhibit six species. These are the Himalayan Black Bear, the Hairy-Eared Bear from Central Asia, the Malay Sun Bear, the Japanese Black Bear, the Great Yezo Bear of Japan, and the buff-colored Syrian Bear from Asia Minor.

Of the members of the order of apes and monkeys (Primates), we have been able to exhibit the rarest and most interesting species found in the Old World outside of Africa. The red-haired and amiable Orang-Utan we are never without; but the rare and little-known Siannang, standing halfway between the Orangs and the Gibbons, never has reached us but once. Indeed, we doubt if any other specimen ever came to America than the one brought to us by Captain Thomas Golding.

Of the various Gibbons that have lived to reach the Zoological Park, all, without exception, have been young and puny animals, and not one of them has long survived the fatigue of the journey and the reaction following arrival. Our most valuable and persistent primates from Asia are the Rhesus Monkey, Moor Macaque, Black Macaque, Bonneted, Pig-Tailed and Burmese Macaques, and the Wanderoo Monkey. The Gray Langur is beautiful and interesting, but delicate, and of the few specimens that have reached us, none have survived longer than two years. The Loris and the Slow Lemur are interesting, but lacking in the stamina that is essential to a long-distance change of location from a hot climate to a cold one.

The Rodents of Asia are sufficiently numerous; but very few of them are so interesting in form and in color as to justify their transportation half way around the world. The number of species that have represented the Asian fauna in our collection has been very small, and the most conspicuous ones are the Indian Porcupine, the Malabar Squirrel—largest of all living squirrel species—and Prevost's beautiful squirrel of black, white and gray.

AFRICA.

Zoologically, the procession from Africa is the richest in species of commanding importance. Both from the standpoint of the showman and the zoologist, the mammalian fauna



ONE OF THE GREAT ALASKAN BROWN BEARS.

of Africa stands pre-eminent. If our wild representatives of the Dark Continent could really be marshaled in one long caravan, the spectacle would be highly impressive. Looming up in front would be a pair of Sudan Elephants, with the enormous external eararea so characteristic of that species. Behind them would come the Pigmy West African Elephant of the French Congo, with small round ears, and tusks of great length for so diminutive an elephant. A pair of Black Rhinoceroses would come next, followed by a Hippopotamus, a Wart-Hog and the Red River-Hog, which, be it remarked, is the only beautiful swine species in the world.

Of the wild equines there would appear the Mountain Zebra, rarest of all species; the Grevy Zebra, one of the largest and in some ways the most remarkable; the Grant Zebra, and Chapman's. To these the Somali Wild Ass must be added as soon as circumstances will permit.

As all the world knows, Africa is singularly weak in species of sheep and deer. The whole of the Dark Continent produces only one

species of sheep, the Aoudad, which inhabits the mountains of the Barbary States of North Africa. Africa's one species of deer, which also represents the Barbary States, never has been exhibited in the Park.

When we approach Africa's magnificent group of antelopes and giraffes, it is hardly possible to recall from memory the species in our collection without risking the omission of something important. If there is anywhere gathered in one spot a larger collection of African antelopes than is to be found here, we are not aware of it.

Although the Giraffe is not to be regarded as an "antelope," there is some excuse for placing our pair of Nubian Three-Horned Giraffes in the Antelope House, where they have thriven for five years, and during which time the male has grown from ten to fourteenfeet-six in height.

The Eland, largest of all African antelopes, has been with us since 1903, and has bred here once. We rejoice in the possession of a fine male Sable Antelope, a Greater Kudu, and Baker's Roan Antelope, three species of great

rarity and value. The White-Tailed Gnu, the Brindled Gnu, the Common Waterbuck, Leucoryx and Reed-Buck, have been on exhibition ever since the Antelope House was opened in

1003

Among the rarest of our antelopes are the Lecheé, the Addax, the Beisa, Congo Sitatunga, Speke's Sitatunga, Bontebok, Blesbok, and Redunca. Our only specimen representing the group of Duiker Antelopes was deposited by ex-President Roosevelt. It was the first game-animal of Africa to greet him at Mombasa.

The large Carnivora of Africa have been much in the public eye; but if the Dark Continent has an extensive fauna of small carnivores, it remains to be exploited. The well-known species seen here include the Lion, Leopard, Chectah, Serval, African Wild-Cat, Hyaena Dog, Black-backed Jackal, Genet, Mongoose, Meerkat, and a few others. All these, save the three species that are temporarily absent through sudden death and slow replacement on account of rarity, are now among those present in the Zoological Park.

Of all the large carnivora of Africa, the Cheetah is the most delicate and the most difficult to keep in captivity for a term of years. The Lion and the Leopard are the species that

are most nearly indestructible.

So far as heard from, Africa, in proportion to its enormous area, is very poor in Rodents; and the only representative of that Order of which our collection to-day can boast, is the African Porcupine—he of the enormous black-and-white quills. But everything that Africa may lack in Rodents is made up many times over in her splendid series of Primates. Fortunate, indeed, is the Zoological Park, or even the museum, that can show representatives of all the most important species.

Orang-Utans, old and young, from babyhood to complete adolescence, and sometimes two species together, we have exhibited. Since the erection of the Primates' House, it never has been without its Chimpanzees, and usually several specimens have been visible together. The Long-Haired Chimpanzee from Central Africa is distinctively different from the Bald-Headed species of West Africa.

The group of Baboons contains several species scarcely less wonderful in form than the great apes. To-day we exhibit a full-grown male Mandrill, in all his panoply of variegated skin colors—scarlet, blue, purple and white. The *Gelada Baboon* species, which we have shown for several years, is, in a mature state, strongly suggestive of a high-class male

African lion of miniature size. Among the Baboons, adult males of this species may justly be regarded as the rarest of the rare; but it has been our good fortune to possess two.

The Hamadryas also is highly picturesque, especially on account of his grand side-whiskers and hair shoulder-cape of aristocratic gray. The East African Baboon and the Long-Armed Yellow Baboon have bred here successfully, and reared their young. The huge *Chacma* was for several years an inhabitant of the Primates' House, but not long since passed off the stage.

Of the species belonging to the African Genus *Cercopithecus*, we have had and still retain many species; but it is out of the

question to enumerate them here.

Of the beautiful and mild-spirited Lemurs, our great lemur cage furnishes a comfortable home for a number of species, the most conspicuous of which are the black-and-white Ruffed Lemur, the Ring-Tailed Lemur, the Black Lemur and the Brown.

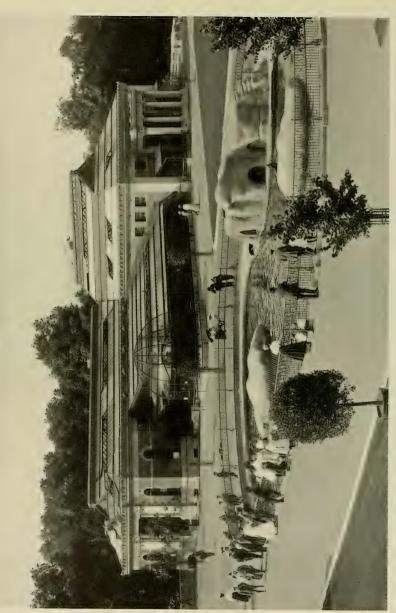
AUSTRALIA.

Last to arrive, but by no means last in zoological importance, is the queer procession from Australia. Although zoologically it stands as the lowest of mammals, the first species that comes to mind is the *Echidna*, two specimens of which delighted and amazed visitors to the Zoological Park throughout twenty months. Even more rare than the Echidna was the *Tasmanian Wolf*, or Thylacine, which we successfully acclimatized and kept for several years, winter and summer, in one of our large fox-dens.

The Tasmanian Devil—black, large-headed, fierce-tempered and ugly—is a more frequent visitor, and we know that in the United States there are at this moment eight or nine specimens. The Dingo, or Australian Wild Dog, breeds readily in captivity, and is irrepressible. Of Kangaroos our collection contains the Great Gray Kangaroo, the Red, the Brushtailed Wallaby, the Rock Wallaby and the Rat Kangaroo. We have diligently sought the Koala and the Wombat; but neither has

deigned to visit us.

On the whole, we have every reason to be thankful for the good fortune that has sent to us, during the past ten years, so many rare and interesting species of mammals. With the stress of building construction once ended, at least for the immediate future, it will be a great pleasure to strengthen our collections generally until they reach a point much above their present standards.



NEW HOUSE FOR PERCHING BIRDS, BAIRD COURT.

HISTORY OF THE BIRD DEPARTMENT OF THE ZOOLOGICAL PARK

By C. WILLAM BEEBE Curator of Birds

INTRODUCTION.

IKE everything in this world which makes life worth living, a collection of living birds can never reach a point where it may be said to be perfect. But there is a period in the history of a collection of birds in a zoological garden when we may say "enough for the present"; and that is when all the principal Orders are represented, and when the visitor, completing his survey of the collection, has passed in review birds typical of every continent and ocean, every zone and every walk or flight of avian life.

To my mind, a collection of living birds achieves its highest ideal when it appeals to the wisest range of humanity. At one time or another I have heard all the following ex-

clamations:

The sympathetic lover of birds: "How happy and contended they all seem; how clean their quarters; how fresh their food and water; how delightful to study them at close range!"

Milady of fashion: "Never will I wear aigrettes again after seeing them adorning the living form of their rightful owner!"

The artist: "The grace of movement and perfection of color and form of a bird are

my despair!"

The ornithologist: "Here is opportunity for the solution of a hundred problems; the Bower-bird's play-house—the mystery of song and color and courtship!"

The foreigner: "Ach, das Heimweh! Der

Nachtigal von der Vaterland!"

And the child of the slums at first sight of a cageful of brilliant birds stands speechless

with delight.

The success or failure of a collection such as the one under consideration, which is primarily for public exhibition, lies altogether with the visitors. If they are pleased, entertained and instructed, the collection is a success. And this satisfaction lies altogether in the human imagination; in the cases mentioned, it is affection, sympathy, esthetic appreciation, the desire for knowledge, reminiscence, or childish wonder. And the only true method of achieving success is by cater-

ing to all these tastes, putting oneself again and again in the place of the visitor, and asking the question, "If I were he, would I delight in this cageful of birds; or in the word-

ing of this label?"

If I have dwelt on the human rather than the avian point of view, it is because the one depends altogether upon the other. None but the most depraved could take pleasure in the bloody contests of birds, caged with unsuitable companions. All but the most hardened would cry out against badly fed and badly housed feathered creatures, or the keeping of birds under conditions which induced sickness or disease.

Birds are beings with emotions and traits remarkably like our own, although they are close kin to the lowly reptile, so close, indeed, that they have still to shake off the last traces of scales and fingers. But with all their extreme emotions of love and hate, fear and courage, they are creatures almost entirely of the present. In all my experiences with thousands of living birds. I have never known one which did not give every evidence of content and happiness when provided with suitable surroundings, food and companions, adapted to its wild habits of life. When a bird mopes or dashes its life out against its "gilded cage," there is something radically wrong with its owner's knowledge of what conduces to avian happiness in captivity. Birds in captivity should sing and moult, regularly and in due season; they should build nests and rear their young, and, lastly, when they escape, they should return or linger near their home of plentiful food and unknown foes. When, as a result of all this, thousands of our fellow human beings derive pleasure and knowledge from the collection, then the birds have indeed fulfilled a worthy destiny.

DEVELOPMENT OF THE COLLECTION.

Statistics are always an abomination, but there is, unfortunately, no other adequate method of showing the growth of the collection. On November 9th, 1899, the Zoological Park was formally opened to the public. At



HARPY EAGLE.

this time there were two installations for birds, the Aquatic House and the Duck Aviary, and the collection consisted of thirty-six species,

numbering 175 specimens.

Ignoring for the moment the ratio of increase, the department of birds at present, on January I, 1910, is exhibited in ten installations: the Ostrich, Aquatic and Perching Bird Houses, the Flying Cage, Pheasant and Duck Aviaries, the Wild-Fowl Pond, Wild-Turkey Range, Macaw Tree and Crane Paddock. At this date the collection is probably the largest in point of numbers in the world, and includes 27 Orders, 665 Species and 2880 Specimens.

Three additional structures will complete the installation plans for the department; the Eagle and Vulture, the Upland Game Bird

and the Crane Aviaries.

The rate of increase of the collections of Birds is shown in the following table:

		Orders	Species	Specimens
January	1,1900	IO	43	185
	1901	13	104	425
	1902	1.4	163	659
	1903	13	193	680
	1904	13	175	706
	1905	14	165	643
	1906	26	355	1555
	1907	26	491	2104
	1908	26	543	2530
	1909	25	563	2615
	1910	27	665	2880

The only check to numbers in gathering a collection of living birds is accommodation; and with the world-wide interest in birds which exists among men, together with modern methods of transportation, it is not a difficult matter to assemble several thousand living birds. The gain of more than 100 per cent. in species and specimens during the year 1905 hence reflects merely the completion of the large bird house with its series of 125 cages.

The critical and difficult problems with which a Curator of Birds has to contend are those of housing, feeding, and doctoring.

It is not my intention here to enlarge upon these subjects, as I have treated them in detail in my contribution to the volume on the "Care of Birds in Captivity," soon to be published by the Zoological Society. But some idea of how a pioneer worker in this field learns by experience may prove of interest.

When I use the word pioneer, I refer, of course, to the scientific care of birds in captivity in the United States. In Europe there has been such a keen interest taken in birds

for hundreds of years that a great deal of experience has been gained. But no one has ever taken the trouble to put this on record for the benefit of others. So, after poring over many English and German works on private aviaries, I gave it up and began experimenting for myself.

The problem of "small cage" vs. "flight cage" was decided in favor of the latter, and to-day the loss of life from accident or fighting is practically nothing. In the first few years considerable time was devoted to the study of avian diseases and their cure, and while much was accomplished, it was soon discovered that prevention was the keynote to success. To-day the most careful attention is given to prophylactic treatment. When a bird arrives it is quarantined, its eyes, throat and body examined, and its feathers dusted with insect powder. Then, before being placed in a cage, the pugnacity of its prospective cage-mates, the temperature, water supply, etc., are considered.

For the thousand and one contingencies which constantly arise in work of this kind no hard and fast rules can ever be framed. Snowy Owls are most interesting and beautiful birds, but they invariably sickened and died in the intense heat of summer. But instead of putting this species on the black list, whose keeping would mean only cruelty, the expedient was tried of putting the birds in cold storage as it were, placing them in a cool, dark, damp cellar—the nearest approach to the conditions of an Arctic night. It worked like magic, and at the first frost in the fall they appeared in perfect plumage, fat and with every feather cleanly moulted.

Or, when we found ourselves with a score or more of recently hatched terns and skimmers clamoring for predigested fish, starvation seemed imminent until the thought of the wood ibises came to mind. Two hours after a hearty meal these birds, if slightly annoyed, will regurgitate a clean mass of half-digested fish, which proved to be the salvation of the little terns.

The macaws were the bane of the bird house. Kept together in one cage they screamed from dawn until dark; they cut through the wire and gnawed the floor, and occasionally they committed murder. The Raccoon Tree gave a hint, and a big dead cedar was set up in Bird Valley; a two-foot sloping wall of metal was placed around it, the primaries of the half dozen macaws were clipped and the birds turned loose upon the tree. Result: their voices were lost in the



THE GREAT FLYING CAGE, Summer Home of the Large Water Birds.

open air; their colors and gymnastics interested circle upon circle of visitors; they forgot to chew their perches and each other, and life was made bright for them and their

keepers!

The evolution of the perfect label has been gradual, but thorough. It was at first only a mere tag giving the name and habitat, awkward in size and altogether uninteresting, upon which new ideas have been engrafted, until now no further improvement seems possible. On each label is a well-executed painting, in oils, of the bird; its names, common and scientific; its range, and one or two carefully worded sentences giving two or three facts of greatest interest in life history or value to mankind.

A tedious labor, but one which has well repaid the time and thought spent upon it, has been the forming and keeping up to date of a day-book, a sheet catalogue and a card index of the history of every specimen ever included in the collection. In the card index all the label data has been added for reference.

These are a few of the fascinating pursuits demanding attention in our daily work.

THE PROMOTION OF ZOOLOGY.

The primary object of such a collection as that of the Zoological Park is, of course, the entertainment and instruction of the people; but the promotion of Zoology is one of the chief secondary objects. Birds have been studied far more thoroughly as skins and mounted specimens than as living organisms, and this field of research for the ornithologist is almost illimitable. As contributions to this branch of ornithological work, the following has been accomplished:

During the ten years of development of the Department of Birds, the Curator has made eight expeditions, at his own expense, covering about twenty-three thousand miles, and making studies of the bird life of the following regions: Nova Scotia, Gardiner's Island, the coast and interior of Virginia, Florida, the Kevs, Trinidad, Venezuela, and British Gui-

ana.

These trips have been valuable in many ways, as the discovery of the food and other requirements of little-known birds. One direct result which comes to mind, was the adoption of a new diet for trogons, birds usually so delicate that they survive only a few months, but which now thrive for many years in perfect health. The expeditions have also contributed directly to the collection.

about seventy-two species and 390 specimens of living birds having been collected and

brought to the Park.

Five volumes have been written and six scientific contributions have been published by the Zoological Society forming the first six numbers of *Zoologica*. The most important of these relate to the effects of humidity on the colors of birds, and the solution of the problem of racket formation in the tail feathers of the Motmot.

THE COLLECTION ITSELF.

At first every bird offered was accepted, but as cages were filled and space became more valuable, careful selection became necessary. The deciding factors at present are length of life, beauty, and scientific interest. To us it seems hardly worth while to attempt to exhibit birds such as humming-birds, whose lease of life in captivity is at most only a few weeks.

It is now our endeavor to acquire birds of special interest. An entire cage of the common birds of one locality, such as Cuba or Trinidad, or one containing the dull-hued forms of our western deserts—flycatchers, thrashers, road-runners and quail—we regard as of special in-

erest

The policy of the Zoological Society has been to advance with caution, and the success of the installations show the wisdom of this method. Thanks to the thorough study made by Director Hornaday of the European zoological gardens, we have been able to avoid many errors.

The Pheasant Aviary, with its fifty-four enclosures and runways, is well adapted for the exhibition of this "difficult" group. Among the especial features of excellence is the comprehensive use of cement and wire, thus bidding defiance to that ever-present plague of all zoological parks-rats. An upper tier of cotes provides accommodation for a collection of pigeons and doves. The pheasants, being terrestial, form a lower stratum of life, seldom leaving the ground, while the pigeons spend their time among the branches of the shrubs and on the perches, and thus the entire runway is put to account. This idea of making a cage or aviary do double duty has worked out admirably with many other species.

Our Pheasant Aviary has contained nearly all the species of pheasants ever imported to this country, or which have been on exhibition, besides other interesting game-birds such as the Capercailzie and Black Grouse. A small flight of pigeons, having their cote in the upper



JABIRU STORK.

part of the aviary, represent all the more choice and more interesting domestic breeds.

Ring doves have been bred in large numbers, and an opening in the roof of their runway permits them to fly out and in at will.

The Wild-Fowl Pond is a paradise for ducks and geese, and hundreds of ducklings have been hatched in the wilderness of reeds and grass along its eastern border. The wings of many of these have not been clipped, and toward dusk the free-flying flocks begin to come in not only from the other ponds in the parks of the Bronx, but even from the Bay and Sound, sometimes two or three hundred ducks assembling before dark. On this pond all the seven species of Swans known to exist have been exhibited at one time.

The Wild Turkey Range, with its dense underbrush, almost invisible fencing, and absence of all artificial shelter, is the least artificial enclosure for birds in the Park. Summer and winter the splendid gobblers strut up and down in full view, and at night fly up with their mates and roost among the branches. The one drawback is the impossibility of rearing turkeys near New York City, and farmers are no more successful than we. Disease invariably attacks the young birds, in spite of all precautions.

After years of endeavor, Dr. Hornaday has just succeeded in obtaining specimens of the rare and delicate Ocellated Turkey of Yucatan, which, so far as we are aware, has never before been exhibited alive in America. The collection is rich in species of the South American turkey-like birds, curassows, guans and chachalacas, and the day is coming when these birds will require a special installation. Unfortunately, they are not hardy and must be warmly housed in winter.

The Macaw Tree, already described, has been successful beyond expectation, and will be elaborated in the near future. These birds are splendid for exhibition, but, up to the present time, their successful accommodation has been a difficult problem. A constant supply is being offered by friends of the Society, and as these birds seem never to die natural deaths, this exhibit gives promise of being a large one. We have found that after being confined by a chain on the leg for a time, they may be set at liberty, and will not leave their comrades, but delight the eye by flying from tree to tree, all through the summer.

Ever since its erection in 1800, the great outdoor Flying Cage has been a constant source of pleasure, a success from the point of view both of the birds and the visitors. The deaths in this avian community have been very few and far between, and the activity and glossy appearance of the birds shows their perfect condition. In the great pool the pelicans, flamingos, herons and rare tropical ducks disport themselves, while in a partitioned part of the pool the curious penguins spend their time. Curassows keep much among the branches of the trees, contrasting oddly with the vultures. The latter, indeed, are a most useful adjunct, as they are ever hungry and never allow a stray bit of fish to remain after the water birds have dined. Here in this great cage the California Condor has his summer home. In the matter of these all but extinct condors, the Society has been very fortunate, having obtained three individuals. The first died a victim of some cruel visitor who gave it a rubber band; but the other two are now living. Both are very tame and most interesting birds. The fully adult specimen is just now acquiring the brilliant colors in its third

year, while the other has not yet shed all of its natal down.

As a place for rearing birds the Flying Cage is not successful, chiefly on account of the mischievous magpies and crows who delight in pulling apart the nests of herons and ibises; but the magpies add so much to the beauty of the cage that they are permitted to remain.

Toucans have been tried in this cage, but in spite of their brilliant colors, they are all but invisible amid the sunlit green leaves. The egrets have attracted a great deal of attention, and the sight of their graceful plumes has doubtless added not a little to the efforts of bird lovers to stop their slaughter for milli-

nery purposes.

Owing to the lack of a Crane Aviary and an Eagle and Vulture Aviary, the Ostrich House has been put to divers uses. The great birds of the African deserts dominate it, however, and no fewer than twelve species of ostriches and their allies, including rheas, emus and cassowaries have been on exhibition. The experiment is now being tried of keeping ostriches outdoors in winter, with a very slightly heated shelter.

In summer, the large runways of the Ostrich House have been utilized to hold a varied assemblage of birds. Rheas, cranes, brushturkeys, Java peacocks, screamers and seriemas have been found to live amicably together, and the sight of birds so unlike one another, associating peaceably, seems to arouse great interest in the mind of the average visitor.

The first installation to be thrown open to the public was the Aquatic Bird House, and considering what it has been called upon to accommodate, it has rendered valuable service. Its metal cage frames and wooden floors have been literally worn out with usage, and the latter have been replaced with concrete.

In the central flying cage the tropical waterfowl and waders are housed during the winter. A large diving-tank is occupied from time to time by penguins, snake-birds and cormorants. Thirty-five species of ibises, storks and herons have been exhibited, from the rare Great White Heron of the Florida Keys to the Little Green Heron of our mill-ponds. Most interesting of all the ibises is the Sacred Ibis of Egypt, the species so often figured in the ancient hieroglyphs that decorated the monuments of that country. Rarest of the whole group, however, is the Jabiru, of which hardly a half dozen skins exist in our museums! An unusually large specimen is now living in the Park, an individual so pugnacious that he must be caged alone. Indeed, he is as little



WHOOPING CRANE.

afraid of his keeper as of his fellow storks. Fortunately, such an idiosyncrasy is rare among birds. At present there are in the collection three other featured individuals of the same temperament—a golden eagle, a cuban robin and a red-crested cardinal. These will kill, or try to kill, any bird with which they are caged, and will hurl themselves with frenzy at one's hand if it approaches their cage.

Still another example of individuality is seen in three American bitterns now in the Park, which are tame and in perfect health, while the half-dozen others which we have had from time to time were all vicious and murderous.

It is of interest to note that at present the collection of American storks is complete, including the Maguari Stork, Wood "Ibis" and Labirn

Like the Ostrich House, the Crane Paddock is a conveniently elastic installation which, beside cranes, occasionally includes cassowaries, herons, marabous and other birds. In winter, however, all migrate to their winter quarters saye the two American cranes, the

Sandhill and Whooping. The Whooping Crane appears to be as rare as the California condor, and its history in the Zoological Society collection has been much the same. Three specimens have been exhibited. Of these the first was killed by a dog. In partial return for many favors, the second has been sent to the Duke of Bedford, and the third is thriving here in solitary state.

The Duck Aviary is for the systematic collection of ducks, geese and swans, of which the flock on Wild-Fowl Pond is the overflow. About seventy species of these birds have been exhibited, and a large number of species are

always living in the Park.

There are probably only one or two other places in the world where Trumpeter Swans may be seen alive. The Tree-Ducks are well represented—seven out of the nine known species being now in the collection. The northern end of the Duck Aviary has been given up to herring gulls. Five or six years ago a small flock of these birds began breeding in this enclosure, but unfortunately they were exterminated by an inroad of fierce minks. No fewer than eleven of these really wild animals were trapped in the Park during the next few years, and they now seem to be eliminated. A new lot of gulls has been obtained from Lake Champlain, and it is hoped they will establish a strong colony.

The specimens of Pelecaniformes which have been in the collection, and the long lease of life in captivity of these specialized birds, is a matter of unusual interest. Every group is represented; cormorants, snake-birds, gannets, frigate-birds, tropic-birds and, of course,

pelicans.

The collection of hawks, eagles, vultures and owls, although an excellent one, is still without a home, and has been temporarily housed here and there, wherever opportunity offered. The collection of New World Vultures is complete,* there having recently been added the Yellow-headed Vulture which, I believe, has never before been exhibited in this country. I brought home several of these birds from my last expedition to British Guiana.

Between thirty and thirty-five species of hawks and eagles are quartered in the outside Aquatic House cages, in the Ostrich House and elsewhere. Among the most interesting species are the Caracara, Lammergeyer, Bateleur Eagle, White Gyrfalcon and Osprey.

Owls to the number of twenty-three species have found accommodation in the outside Aquatic cages. A whole flock of Burrowing Owls has recently been secured.

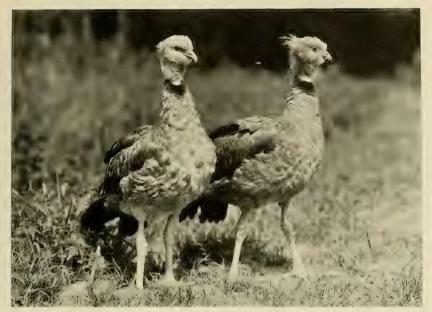
In connection with the hawks, mention must be made of a new type of installation recently adopted, which has combined economy with great usefulness. This is a series of mediumsized portable cages, measuring eight by four feet, by six feet high. In summer these are placed on the grass in any convenient paddock or range, and in winter on movable bases in the Ostrich House. Hawks, owls and many small birds have been kept in them with good results. Species which scratch among the grass for insects can be shifted every few days to new pastures if necessary.

The beginning of the perching-bird exhibit was marked by the gift of a baby robin which had fallen out of the nest, and was reared by hand in the Aquatic House. The following year fifteen species of native birds were thus reared from the nest, but the group, as a whole, had no proper home until 1905. In that year the crowning exhibit of the department of birds was opened-the Large Bird House, for perching birds and their allies. In this building there are at present quartered almost two-thirds of the entire collection, both of species and specimens. A single building which will successfully accommodate no less than 370 species and over 1,700 specimens of living birds is one well worth visiting. These birds are quartered in a single large central flying cage, and in 124 wall flight cages, thirtyfour of which are outside. These enclosures average four by five feet, by nine feet high.

It is possible that parrots thrive equally well in smaller cages, but all other small and medium-sized birds, without exception, do better and appear to far greater advantage in these flight cages. Here the stratum arrangement is carried out in almost every cage; terns and rails on the floor, thrushes and jays flying and perching overhead; trumpeters and small quail below, tanagers and flycatchers above.

It would be tedious even merely to enumerate all the rarities of this houseful. In the Parrot Hall, where some seventy odd species of parrots and cockatoos have clambered and shricked to their heart's content, there are three species worthy of mention, not only from their rarity, but also because of their unusual colors. The great Banksian Cockatoo of Australia, with its black plumage and scarlet tail; the huge Hyacinthine Macaw of Brazil, a study in blue with a beak like a lineman's wire-cutter; and the dainty and unsurpassed Spectrum Parrakeet, a bird with every color of the rainbow in his plumage.

To pass rapidly in review the "odd birds" in this building, we find rollers, laughing king-



CRESTED SCREAMERS.

fishers, hornbills, hoopoes, motmots, trogons, toucans and bower birds. The Trogon lives on in spite of his delicacy; the Motmot preens the webs from his tail-feathers before our eyes; the blue-eyed Bower-bird pays no heed to the visitor as he arranges his garden and ornaments, and dances before his mate.

Here the Road-Runner leaps from floor to roof of his cage in play, and the quaint Ani Cuckoos or Witch-Birds sit closely huddled,

two or three deep on their perches.

If one wonders how the tremendous beak of the toucan ever came about, he may follow back the graduations as shown in the next cage by the toucanets, and farther on by the barbets. The woodpeckers, represented by the Greater Spotted species from Europe, and Golden-Fronts from the tropics, with our own Northern Flickers, clamber and dig holes in their trunks with the splendid virility which always marks these birds.

What shall we say of the two hundred and fifty or more sparrows, thrushes and their kin? They sing in their delight at the neverfailing food and the lack of danger.

Not a country in the world is unrepresented, from the Hoary Redpoll, fresh from the icebound shores of Greenland, to the brilliant Tanager of the tropics; from the Bulbul of the far east, to our own Mocking-Bird,

The European hears with delight the Nightingale, Robin Redbreast and Bullfinch. The myriad Weavers of Africa weave and chatter in a cage with a hundred of their fellows. The warble of the Australian Piping-Crows must bring memories to the mind of every visitor from that country, just as the Solitaire and the Kiskadee Flycatcher recall to mind our own tropics.

The collection of native American birds is probably unsurpassed, and many a student checks off his vaguely filled note-book from the living bird here within arm's reach.

No matter how enthusiastically one may go about forming a collection of living birds, without capable and willing help all is of no avail. In the matter of keepers the Zoological Park has been particularly fortunate in obtaining men who love their charges, who gladly work over-time and who devote many spare hours at home to thought and planning for the birds in their care. To these men is largely due the credit for the successful maintenance of the collection.

REPTILE HOUSE.

REVIEW OF THE REPTILE EXHIBITS OF THE ZOOLOGICAL PARK

By RAYMOND L. DITMARS
Curator of Reptiles

ITH the object always in view of keeping a representative collection of reptiles of the world on exhibition, the curator of this department has been constantly in touch, during the past ten years, with the various sources whence come interesting reptiles and batrachians of the tropical and temperate latitudes. An imposing aggregation of scaled and plated creatures from many widely separated localities has occupied the cages of our Reptile House during its ten-years' existence. Several of these reptilian exhibits have been recorded as the first living examples ever transported from their native wilds. Among these have been many deadly snakesthe educational and practical value in the exhibition of which may be immediately surmised.

With the close of our work at the end of our first ten-year period, comes the realization that we have reliable agents to represent us in many parts of the world, and our resources may be relied upon to quickly close gaps made in our collection by death among the specimens. As an example of the care taken to maintain a complete series of the reptiles and batrachians of the United States, it must be explained that we have agents in all the various districts corresponding to the many life zones of the reptilian fauna of this country. divisions of this fauna cover the deserts of the Southwest, the Pacific slopes, the Great Plains, the Texas region, the rich coastal swamps of the Southeast, and other regions of lesser area.

For the purpose of making the Reptile House as comprehensive and instructive as possible, a number of expeditions have been organized, in order that quantities of certain important species might be collected. Several of these expeditions were for the purpose of collecting reptiles not before exhibited collectively. One of these trips, to the low grounds bordering the Savannah River, resulted in the capture of over five hundred serpents, representing a great number of species. After several years this expedition was repeated. Regular expeditions to the ledges of the Taconic Mountains, in Massachusetts, with

their dens of rattlesnakes, have made possible the exhibition of large colonies of these poisonous reptiles.

The collection is thus kept at a uniformly high standard. Orders are always outstanding with our agents for those particularly interesting species of the tropics that are notoriously short-lived. As many of the smaller reptiles are very delicate, gaps caused by death are immediately filled by specimens from different localities. Thus our collections are varied from time to time. New specimens are being constantly added during the warm months, and if possible, grouped to form fresh and striking features, the significance of which is shown on explanatory labels. The average number of serpents, lizards, crocodilians and chelonians on exhibition in the Reptiles House is about fifteen hundred. These represent an average of about two hundred species.

Besides presenting a review of the work done in the Reptile Department since the opening of the Park, it is the purpose of this article to mention some of the rarer reptiles that have lived in the collection. Before so doing it will be of interest to mention some of the reptiles that have lived longest since the opening of the Park a little more than ten years ago.

A series of alligators, captured in the vicinity of the Indian River, and purchased of Mrs. C. F. Latham, Florida, was installed ten years and four months from the present date. All of these animals are to-day in perfect condition, with the exception of one large specimen that died from old age. These animals have all increased to twice their size upon arrival. One example has grown from a length of five feet, into a monster of slightly over twelve feet. Our oldest alligators have been twenty-two years in captivity. These were donated to the Society by the writer at the opening of the Park.

Among the turtles and tortoises are many specimens that have thrived ever since the official opening of the Reptile House. The oldest serpents in the building are two Cotton-Mouth Moccasins, a pair, bred in separate litters by the writer over fourteen years ago. These snakes have bred several times since

they were placed in the Reptile House. The fine example of the King Cobra, occupying the third from the east end of the large north cages, has flourished for the past nine and onehalf years. The two examples of Cobra-de Capello have been on exhibition for the past nine years, and are as vigorously malicious as upon the day of their arrival.

To best review the more interesting and valuable reptiles exhibited in the Park during the past ten years, we will consider them from the standpoint of the countries they inhabit, as

follows:

NORTH AMERICAN REPTILES.

As an important section of the exhibition of the North American reptiles and batrachians there has been steadily maintained since the completion of the Reptile House, a series of the chelonians, lizards, snakes, frogs, toads and salamanders inhabiting New York and the adjacent States. These local species have been shown collectively, and supplied with descriptive labels. The poisonous reptiles occurring locally have been furnished with special labels. Species of economic value have been accredited with their usefulness to the agriculturist.

This scheme of collectively exhibiting reptiles that naturally fall into particularly interesting groups, has been generally followed as space and public interest have prompted us. One series of the kind, always popular with visitors, is a collection of desert reptiles, collected in northern Mexico, New Mexico, Arizona, and southern California. Upon their native soil, some of which we have had boxed and sent us from the Southwest, and with cage settings of cacti and other curious plants of the sterlie regions, we have exhibited an aggregation of creatures of monotonously pallid hues, though grotesque and even uncanny in their incongruously varied forms and habits. In the series of the rarer lizards of the southwestern United States we have shown the beautiful Fringe-Toed Lizard, (Uma notata), a lacertilian of extraordinary pattern, having a fringe of flattened spines along the toes to prevent it sinking into the vielding sand as it skims over sunburnt wastes in search of insect prey; the greater number of the species of the Horned Lizards, (Phrynosoma), some of which are very rare, even in the alcoholic series of the great museums; the Chuckawalla, (Sauromalus ater); the several species of large Spiny Swifts, (Sccloporus); the strikingly colored Leopard Lizard and the the Collared Lizard, (Crotaphytus), which run at great speed upon the hind legs; the Zebra-Tailed Lizard, (Callisaurus draconoides), appearing ordinary enough until it dashes away with the long tail curled over the back showing the under portion of that appendage to be boldly marked with alternate black and white bars; and the Gila Monster, (Heloderma suspectum), which, with the other American member of its genus stand as the only known poisonous lizards.

Both species of the Desert Tortoises, (Testudo agassizi and T. berlandieri) are exhibited. Among the serpents of our home deserts the Horned Rattlesnake or Sidewinder, (Crotalus cerastes) is a conspiciously strange representative. Like all viperine snakes of the desert regions of all parts of the world,-at least those species that actually live in the areas of yielding sands,-it progresses by throwing forward lateral folds of the body, in rapid fashion, imparting rather the effect of a walking motion than the sinuous movements of a typical snake. Many specimens have been collected by our agents in the Southwest, and we have the gratification of knowing that those examples lost by death have gone to fill gaps in museums lacking representatives of this eccentric species. One specimen of the rare White Rattlesnake, (Crotalus mitchelli), was obtained for exhibition five years ago; and with it came several examples of the Tiger Rattlesnake, (Crotalus tigris). Both are desert animals. Though we have made repeated attempts, we have since been unable to obtain other examples of either species

The Red Rattlesnake, (Crotalus atrox ruber), of southern California, is a reptile that has puzzled visitors to distinguish it from the sandy floor of its cage. The most extraordinary rattlesnake displayed in this series came to us from a desert region in Central America. This was a distinctly bluish reptile, looking precisely as if powdered with pumice dust. Investigation showed it to be a new species, and it was given the technical name of Crotalus pulvis. Among harmless serpents of the American desert regions we have shown a number of phases of the Whip Snake, (Zamenis flagelliformis frenatus), ranging in hue from specimens of clay color into gorgeous shades of coral red. Several examples from Arizona tended to shake the theory of "protective" coloration. These were of a lustrous purplishblack, with a coral-red abdomen. Our collector explained that they were captured in a region of vellowish sand. The smaller desert serpents, such as the Cone-Nosed Snakes or "Candy-Stick" Snakes, genera Ficimia and Chilomeniscus have been often exhibited. Several examples of the gorgeously colored

Scarlet King Snake, (Ophibolus zonatus), and the boldly ringed Chain Snake, (O. getulus boylii), are at all times in the collection.

The reptiles of the central and eastern portions of the United States are easier to obtain, and only a very small proportion of their number can be rated as extremely rare in captivity. Our collection is always rich in this material, and the student finds a fine series for observation. Among the serpents of the southeastern portion of the United States, where the coastal swamps possess an imposing reptilian fauna, is the huge Diamond Rattlesnake, (Crotalus adamanteus), of Florida, Georgia and South Carolina. We have exhibited specimens seven feet in length. Of the rarer snakes of the Floridian fauna, we have had several examples of a peculiar species with an exceedingly slender body, but proportionately very short tail. This is Stilosoma extenuatum, attaining a length of about twenty inches, of burrowing habits, and first described by Mr. Arthur Erwin Brown, of Philadelphia. This snake has, thus far, been captured only in a restricted area of Florida. in Orange and Marion Counties. We never have induced our specimens to take food.

In summing up our efforts to maintain a large series of the North American reptiles it is appropriate to state that we have exhibited thirteen of the seventeen known species of poisonous serpents, and fifty-four out of nintysix species of the innocuous species. Of the Lizards we have exhibited a like proportion. Of the chelonians—the turtles and tortoiseshowever, we have exhibited about ninety-five per cent. of the species inhabiting the United States. Members of both species of the North American crocodilians occupy our tanks. A number of our too-abundant alligators have been hatched in the Reptile House, from eggs collected by the Society's expeditions. Of the Florila Crocodile (Crocodilus americanus floridanus), which inhabits the extreme southerly portion of the Florida peninsula, and is not at all easy to obtain, we display two large examples in the crocodile pool, and several young specimens in the smaller (nursery) tanks.

REPTILES OF CENTRAL AND SOUTH AMERICA.

These countries possess a rich and varied reptilian fauna, and through the many lines of steamers plying to tropical ports we receive much good material. Unfortunately, the intense fear of poisonous snakes among the natives, and the general spirit of unwillingness to transport these creatures on the steamship lines, have resulted in our collection of the intensely interesting vipers of the New World tropics being continually small. Through the interest and courtesy of Mr. R. R. Mole, of Port-of-Spain, Trinidad, B. W. I., the Reptile House has been kept supplied with specimens of the deadly Bushmaster or Surocucu, (Lachesis mutus), and the Fer-de-Lance, (L. atrox), while Mr. Mole has also furnished the Society with examples of the South American Rattlesnake, (Crotalus durissus), and the

Coral Snakes, (Elaps lemniscatus and E. corallinus). He has sent on to New York a considerable number of the harmless snakes, lizards and other creatures of the tropics.

While noting our South American exhibits, our collection of Giant Tortoises should be mentioned. The Galapagos Islands, off the coast of Ecuador, are inhabited by a race of practically prehistoric monsters, tortoises so huge as to be out of all proportion to the terrestrial chelonians inhabiting the continents of the New and Old Worlds. We have two of the several species of tortoises inhabiting the Galapagos Islands. Our specimens rep-



RHINOCEROS VIPER.



SUMMER HOME OF THE ALLIGATORS AND CROCODILES.

resent Testudo vicina and T. nigrita, respectively, the largest and the smallest species of the group. These specimens weigh 220 and 90 pounds. Occupying the same large compartment with these New World monsters are two specimens of the Elephant Tortoise, (Testudo elephantina), a species inhabiting the Aldabra Islands, a group similar to the miniature archipelago formed by the Galapagos Islands, but situated on the other side of the globe, in the Indian Ocean.

The large lizards of Central and South America and the West Indies are probably the most contented members in our reptilian collection. In summer they occupy large sandy yards, which connect with indoor stalls of the eastern end of the Reptile House. Here are shown the big iguanas from the tropics, the West Indian Rhinoceros, Iguana, (Metapoceros cornutus), the Black Iguana, (Cyclura bacolopha), and the Turk's Island Iguana, (C. carinata), all three species inhabiting the West Indies. Of the mainland species are the Spine-Tailed Iguana, (Ctenosaura acanthura), the Banded Iguana, (C. hemilopha), the Tuberculated Iguana, (Iguana tuberculata), and the nose-horned variety of the latterrhinolopha. In these yards the Tegus are quartered, of which the most showy species is the Black Tegu, (Tupinambis nigropunctatus), the examples of which are as gorgeously decorated in spots and stripes of golden yellow as the uniforms of the most resplendant soldiery. Of the more eccentric South and Central American lizards we have exhibited the two species of "Dragons," (Basiliscus), the Tree Runners, (Uraniscodon), and several species of the worm-like members of the Amphisbaenidae.

The greater number of our visitors are much interested in the "big snakes," and South America supplies a liberal number of these. With the exception of the Anaconda. (Eunectes murinus), however, of which we have fine examples, the big constrictors of the New World tropics are not nearly so imposing as the gigantic serpents of the Indo-Malayan region. In our series of the large snakes of the New World we have the several species of the genus Boa, these popularly known as the "Boa Constrictor," the Diviniloqua Boa, Central American Boa and Mexican Boa, representing the genera Epicrates and Corallus, our collection contains the Bahama, Rainbow. and Cuban Boas of the former genus, and Cook's, Rushenberg's and the Green Tree Boas of the latter. One specimen of the Dog-Headed Boa, (Corallus caninus), has displayed its beautiful emerald coils in the cage assigned to these reptiles.

The coastal regions of Mexico and Central America and the great waterways of tropical South America abound with crocodilians, and of these we have exhibited three species, namely the Black Caiman, (Caiman niger), the Spectacled Caiman, (C. selvrops), and the Broad-Headed Caiman, (C. latirostris). From South America and from Central America we have received several examples of the large American Crocodile. (Crocodilus americanus).

INDIAN AND MALAYAN REPTILES.

India, with its strong atmosphere of mystery, appeals to us with a fascination all its own; hence, the oriental reptiles are particularly interesting. The works of Kipling and tales of travel in India and the Malay Archipelago have prompted our visitors to make many queries concerning the reptilian fauna of these regions, and we have sought to prepare a general answer in the shape of an exhibit of the representative scaly creatures that excite especial interest. This has been no moderate task, and it is never-ending.

Among the oriental creatures two types of reptiles are the most eagerly looked for. These are the giant constricting serpents of India, the Malay Peninsula and the great islands, and the poisonous snakes. The former are not so difficult to obtain, as they are imported for speculative purposes by the commanders of the big East Indian freighters plying between America and the Far East.

CALIFORNIA NEWT.

Such snakes as are well cared for on their three-months' journey usually arrive in America in good condition. Yet, it is difficult to obtain really large specimens, and a *large* specimen means a snake about twenty-four feet in length. It is about once in two years that a reptile actually this size arrives in our home ports.

The question of obtaining the poisonous serpents is much more serious. With the exception of representatives of a single species. we have been unable to purchase any Indian poisonous snakes in four-years' time. A personal canvass of the animal markets of Great Britain and the Continent revealed the some scarcity that exists here. Fortunately, we have had excellent luck with our Indo-Malayan poisonous reptiles. We have had no losses among them in the past three years. Of these important reptiles we have fine specimens of the Cobra-de-Capello, showing two phases of Naja tribudians, namely the Spectacled Cobra. or typical phase, and the Masked Cobra, (N. t. semifasciata), of Borneo, Java and Sumatra. The former, with its brilliant "hood" markings is the most spectacular, and it always remains so. The specimens that have been with us for the past nine years are just as vicious as they were upon arrival. A slight jar upon their cage-door or the movement of a hand sends them rearing into their dramatic postures from which they frenziedly strike, upon

> the least provocation. Our magnificent specimens of the King Cobra, Naja bungarus, two in number, are familiar among many thousands of visitors from various parts of this country and Europe. These snakes are fed every Sunday morning, each consuming a freshly killed serpent about four feet long. They are strictly cannibalistic and will eat nothing but other serpents, receiving food only at intervals of seven days. While poisonous snakes generally are delicate and short-lived as captives, it is a remarkable fact that the cobras and all of their immediate allies are to be rated among the most hardy of the inmates of a reptile house. Among these snakes disposition ranges to extremes. The Cobra

de-Capello is excessively nervous and vicious, while the King Cobra is calm and bold, possessing a treacherous degree of hostility that makes it the most dangerous of all deadly

reptiles.

Another famous and very dangerous snake of India and the Malay Islands is the Tic Polonga or Russell's Viper (Vipera russell). We have exhibited specimens of this snake, but the species is a delicate one and shortlived. The proposition of obtaining further specimens of the poisonous Indo-Malayan reptiles is now a serious one. There appears to be a rule among the English lines of steamers prohibiting these animals being carried. With the coming spring it is our intention to enter into negotiations with the Indian Government in order to obtain additional specimens.

The great Kabara-Goya, or Giant Lizard, sometimes called the Monitor, (Varanus salvator), is an Indian reptile that attracts immediate attention. Our seven-foot specimen is large and powerful enough to kill and swallow a young gazelle. It is one of the

largest of its kind to be exhibited.

AFRICAN REPTILES.

The reptilian fauna of Africa is at all times strongly represented in the Reptile House. The tortoises are attractive owing to their large size, variability of structure and bold markings. We have the Abyssinian Tortoise, (Testudo calcarata), (as heavy as sixty pounds), the Leopard Tortoise (T. parddis), the Geometric Tortoise, (T. geometrica), the Radiated Tortoise, (T. radiata, of Madagascar), and two species of the Hinge-Backed

Tortoises, (Cinixys).

Three species of African crocodiles have been shown our visitors. These are the Nile Crocodile, (Crocodilus niloticus), the gaviallike Sharp-Nosed Crocodile, (C. cataphractus), and the Broad-Nosed Crocodile, (Osteolacmus tetrapis). Of the lizards we have had an elaborate series, including an aggregation of the strange forms of the Sahara. These range in size from the powerful Egyptian Monitor, (Varanus griseus), to the several species of Spike-Tailed Lizards, (Uromastix and Xonurus) and the agile Agamas down to the Skinks with their highly polished scales, the latter ranging in form from creatures with flattened toes to support them on the desert sands, to worm-like forms with a sharp snout that literally swim into the yielding soil at the slightest alarm. Four species of the genus Chamacleon have been exhibited.

Africa is the home of the most malignantlooking serpents of the world. Some of these reptiles might be described as all head, fangs and stomach; yet Nature has seen fit to decorate the hideously formed bodies of these deadly creatures with the most dorgeous hues and patterns. Prominent among the big vipers, with their dagger-like fangs, are the Gaboon Viper, (Bitis gabonica), the Rhinoceros Viper, (B. nasicornis), and the Puff Adder. (B. arictans). All of these serpents figure in our list of specimens. The strange little Cape Viper, (Causus rhombcatus), and the pallidhued desert vipers—the Cerastes, (Vipera ccrastcs), the Yellow Viper, (V. vipera), and the Pigmy Viper, (V. eva), have been shown in the Reptile House with surroundings to represent their native wilds. Several transparencies made from photographs of the sterile regions have been fitted against the backs of the cages containing the desert snakes. Of the African cobras we have exhibited the famous Asp, (Naja haje), the Black Cobra, (N. melanolcuca), and the Ringhals, Ring-Necked Cobra, (Sepedon haemachates). Representatives of several species of the African pythons are at all times in the Reptile House.

REPTILES OF AUSTRALIA.

At the time of preparation of this article a fine series of Australian reptiles is on exhibition. This includes five species of lizards and eight species of snakes. The Frilled Lizard, (Chlamydosaurus kingii), with its dilatable neck-flaps, the two species of the Giant Skinks, (Cyclodes), and Cunningham's Skink, (Egérnia cunninghami), show the eccentricities of the Australian lacertilians, while the Black Snake, (Pseudechis porphyriacus), the Tiger Snake, (Brachyaspis curtus), and the Gray Death Adder, (Denisonia superba), illustrate how remarkably inoffensive is the demeanor of the many deadly serpents of that country. The Diamond Snake, (Morelia spilotes), and the Carpet Snake, (M. variegata), are both on hand as illustrations of the prettily marked pythons that range over a considerable part of Australia.

EUROPEAN REPTILES.

Our collection of the turtles and tortoises, the lizards and the snakes of Europe is very full. In fact, these reptiles are as well represented here in the Park as in the continental zoological gardens of Holland, Belgium, France and Germany.

RARE BATRACHIANS EXHIBITED.

Crowded as we are for cage space in the Reptile House, the curator has done his best to continuously present a good series of the batrachians, the frogs, toads and salamanders. The collection always on hand meets the requirements of the student, but, at their best, the majority of the batrachians make a poor display, owing to their secretive habits. During the spring the metamorphoses of the frogs, toads and the salamanders are fully displayed. Of the rarer species exhibited it is appropriate to mention the Golden Tree Frog, (Hyla aurea), of Australia, Anderson's Tree Frog, (Hyala andersoni), and the Brown Frog. (Rana virgatipes), both of the eastern United States: the South American Frog, (Leptodactylus pentadactylus), the Surinam Toad, (Pipa americana) and the South African Smooth-Clawed Toads, (Xcnopus laevis and X. Clawed Toads, (Xenopus lacris and X, muelleri). The Blind Salamander, (Proteus anguinus), has twice figured among our ex-

WORK OF THE REPTILE DEPARTMENT.

It will be of interest to our members to give a brief *résumé* of work performed in the de-

partment during the past ten years.

One of the branches of work has been the preparation of many semi-technical and popular articles that have appeared in our publications. It has been the intention of the writer to produce as much practical matter as possible in order that our observations may have a wide value. With this object always primarily in view, he begs to refer, as results, to his article on the growth and care of the American alligator, pointing to the practicability of alligator farming, and appearing in our Eleventh Annual Report; a series of articles relating to the venomous snakes, their habits and virulency and general distribution; articles dealing with the diseases and care of reptiles, with the breeding of reptiles, best methods of exhibition and the experiences of the collector in the field. Almost synonymous with the matter for publication is

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the work of preparing labels, the great majority of which are descriptive. While the greater number of our labels are painted in oil, on zinc, there is a generous number of labels containing elaborate details, that are printed, framed and protected with glass. In addition to these labels there are colored maps and charts showing the distribution of important groups, or giving a simple and concise view of classification.

To answer the frequent queries of visitors, a collection of skulls of reptiles illustrating the differences in dentition between the non-venomous and the poisonous species was mounted and placed in a conspicuous position on the main floor of the Reptile House. In this case is exhibited the latest paraphernalia employed in the treatment of snake-bites. The exhibits in this cabinet are changed from time to time, in order to emphasize anatomical characteristics of the living specimens on exhibition in the surrounding cages. All of the skulls exhibited are prepared and mounted in

the Reptile House.

In the routine work of maintaining our collection of reptiles and in making this department as attractive as possible, may be mentioned our surgical operations upon a number of valuable specimens, and the successful termination of the curator's endeavors to combat the dreaded snake "canker" and necrosis of the jaw. This work has often involved the handling of the poisonous serpents, but we have the satisfaction of realizing that about eight years ago our very popular King Cobra was cured from what at first appeared to be a hopeless malady. One of the Indian Hooded Cobras now on exhibition was likewise successfully operated upon several times for necrosis of the jaw-bone about five years ago.

The very satisfactory process of force-feeding several of the great pythons from the Malay Peninsula and Borneo, which stubbornly evinced a dramatic inclination to starve to death, is demonstrated by the presence of the splendid examples now occupying the big central cage. It took two years of this treatment to induce them to feed of their own

accord.



NORTH SHORE OF LAKE AGASSIZ, ZOOLOGICAL PARK. Large numbers of Water-fowl live here the year 'round





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FISHING WITH POISONS.

THE New York Aquarium, while the largest institution of its kind in the world, is still sadly limited in its collections of aquatic life, and the Director does not always have new exhibits to draw upon for matter for this Bulletin. Let us leave our restricted field in New York for a few minutes and visit the world's great center of fish life—Polynesia.

The aborigines of many countries resort at times to methods of fish catching that are scarcely known to the civilized world. Although practiced in widely-separated regions, the methods of taking fishes by poisons, have a

common resemblance in that they all involve the temporary stupefying of the fishes taken. Wherever practiced, the catching is done without apparatus of any sort, other than the locally prepared drug employed for the purpose, which is placed in the water in large quantities. This in apparently all cases, consists of the juices of crushed plants, different kinds being used in different countries.

The plant, of whatever species is available, is gathered in great quantities and crushed until a sufficient supply of the thick, gummy juice is procured the gathering and preparation of the



TONGA ISLANDERS POISON FISHING ON THE REEF.

"poison" requiring the associated efforts of many persons.

When the tide recedes entirely from the reefs about the islands, many large and deep pools remain filled with fishes of all sizes and colors. Into these pools the "poison" is placed and in a few moments the fishes come to the surface in such distress that they can easily be picked up. Schools of small fishes coming in across the reef with the rising tide are also affected by the drug and are easily secured.

While most of the species of plants used are distinctly poisonous to the human stomach, there is no unwholesomeness attached to the eating of

fishes captured by their use.

Necessarily this wholesale method of fishcatching cannot take place very often on account of the great effort required to make it successful. Whenever a "fish-poisoning" occurs, it is the occasion of a general picnic accompanied, like other South Sea functions, with feasting, the wearing of flowers and much jollity. Fishing of this kind is practiced in many parts of Polynesia.

The accompanying photograph which I secured in the Tonga Islands some years ago, shows the natives picking up stupefied fishes from a portion of a reef which had been thor-

oughly "poisoned" with plant juices.

At Raratonga they use the grated nut of a plant known to botanists as Barringtonia speciosa, which is scattered over the bare reef to paralyze the fishes which return to their feeding ground with the incoming tide. Then the people with baskets wade into the shallow water and gather the finny harvest, dip-nets and spears being merely used to facilitate the work.

Another Raratongan plant, (Tephrosia piscatoria), is also used for fish poisoning, the whole plant being pounded and put into the water. Such fishing is sometimes practiced nearer home. On Eleuthera Island in the Bahamas, the negroes use the bark peeled from the roots of a plant locally known as dogwood, which is placed in gunny sacks and pounded. The juice of the plant discolors the water in a few moments, bringing the gasping fishes to the surface where they are easily picked up with dip-nets.

The Indians of Arkansas and doubtless other sections of the middle west, formerly resorted to similar methods of fish-catching.

Bates long ago described in his classic Naturalist on the Amazons, a method practiced by the Indians of the Tapajos in taking fishes. The plant used was the poisonous liana, (Paullinia pinnata), which was crushed for its milky juice. This placed in the water soon discolored it and brought the fishes to the surface with the gills wide open, in an apparently suffocated condition.

THE BURBOT.

THE only fish of the cod family inhabiting the fresh waters of North America is the burbot, (Lota maculosa), which is shown in the accompanying photograph of a specimen living in the Aquarium. It is variously known as burbot, ling, lawyer and fresh-water cusk, and frequents the rivers of our northern States, extending through British America to Alaska.

In the Yukon River, where it is known to the natives as losh, it often weighs as much as sixty pounds. It is an important food fish to the natives of the far north, but in the southern part of its range where it is of smaller size, it is considered coarse and tasteless and seldom eaten.

The burbot frequents brackish waters at the mouths of some of the large Alaskan rivers, running up into the lower Yukon after the river freezes, where it is taken by the natives through the ice in fish traps.

Great quantities of the fish are used as food for the native dogs, the liver yields an abun-



BURBOT.



POSTER GIVING THE LOCATION OF THE PRINCIPAL MUSEUMS OF GREATER NEW YORK.

dance of oil suitable for cooking purposes, and the roe is also edible.

Our four specimens, the largest being about eighteen inches in length, were obtained by exchange with the Detroit Aquarium.

A MUSEUM POSTER.

AST spring the public museums of New York united in the production of a large poster containing information respecting our City museums, two of which are under the control of the Zoological Society. As the accompanying reproduction shows, it states the location, hours of admission, character of exhibits and how to reach each museum. The six illustrations and the map are in colors.

This poster, framed, has already been located in universities, high schools, libraries, Y. M. C. A. buildings and in several railway and ferry houses. It is to be located in other public places with a view to bringing the public museums of the City closer to the people and to the educational institutions, generally.

SPAWNING OF THE WHELK.

As an illustration of the opportunities which a large aquarium affords for natural history observations, attention is called to the two photographs by Mr. L. B. Spencer, showing the spawning process of the channelled whelk, (Fulgur canaliculata).

The empty shell of this large mollusk is a common object around the shores of Long Island, but the living animal is seldom seen unless special search is made for it. Its range is from Massachusetts to Florida. Specimens are often brought from Gravesend Bay, north of Coney Island, to the Aquarium, where they may be seen in the exhibition tanks throughout the year. The dry egg-cases of the animal all connected by a ligamentous cord, are frequently found along the beaches, but comparatively few persons know what they are. Although naturalists have described the manner in which the eggs. or rather the egg cases, are cast off under natural conditions, very few have had the opportunity of seeing the process in an aquarium and of recording the time actually required for its com-



CHANNELLED WHELK SPAWNING. SECOND DAY.

Rear view of the shell.

Photo by L. B. Spencer.

pletion. Although the animal has been under almost constant observation in the New York Aquarium for a dozen years, the spawning process has never taken place there until recently.

On the morning of October 4, 1909, a whelk with six of the connected egg-cases protruding, was found in one of the tanks. In the evening when ten cases were visible, the animal was re-

moved for closer observation to a small tank of flowing sea-water in the laboratory. By the next evening there were sixteen cases in sight, and on the evening of the 6th, twenty-four cases.

The spawning proceeded steadily and the protruding egg-cases were counted each evening. On the 7th, twenty-nine cases had appeared, on the 8th, thirty-five, on the 10th forty-two, on the 10th forty-eight and on the 11th, sixty-three, when the string of cases seventeen inches in length was complete. The length of shell of the mother whelk was eight inches.

During the whole eight days process of egg-laying, the whelk rested on the bottom of the tank with the open side of the shell turned upward and the soft parts but slightly protruding. The position was not changed at any time, but when the egg laving was completed, the animal at once turned and attached itself to the glass front. In nature the whelk buries itself in the sandy bottom at spawning time, the string of egg-cases pushing up through the sand as they are cast off.

Professor Jungersen of the University of Copenhagen who called at the Aquarium a few days later, inquired as to the exact portion of the body from which the egg-cases had been cast off, stating

that in his opinion, "Cunningham's explanation on this point was incorrect." It is to be regretted that the animal was not dissected before the conclusion of the spawning in order that this point might have been determined.

Each egg-case of the whelk contains several embryos, which after a period of development, escape from their membranous case to lead independent lives.



CHANNELLED WHELK SPAWNING. EIGHTH DAY.

The egg-cases are shown floating diagonally across the picture.

Photo by L. B. Spencer.



SOFT-SHELLED TURTLE. Upper side.

SOFT-SHELLED TURTLES IN CAPTIVITY.

SEVERAL specimens of the soft-shelled turtle from Lake Erie, known as Aspidonectes spinifer, are living and thirving in their tank at the Aquarium.

While the species has long been represented in our collections, it was only by annual renewals that the supply of individuals could be maintained. Three years ago the soft-shells were removed to a larger and deeper tank with a view to discovering, if possible, some means of lengthening the period of their lives in captivity.

The depth of the water in their tank was increased to two feet, and a small floating log introduced, upon which they could climb for an occasional airing. Two bucketsful of clean sand were poured into one end of the tank, into which these mud-loving

turtles could burrow for the purpose of cleaning themselves and hiding when at rest. They were very active, frequently chasing each other about the large tank. and occasionally climbing out on the floating log. The soft-shell is the most active of all our native turtles. They took to the sand quite naturally, darting into it and with a few quick movements covering themselves completely. Frequently the entire lot would be under the sand, their small heads and long slim necks alone protruding. Since these changes were made, the turtles have fed freely and none of the specimens has been lost. A supply of sand to hide in, seems to be

a necessity with this species. Upon such apparently insignificant details of management, the successful keeping of wild creatures in captivity depends. All captive animals should be under the care of keepers interested in their welfare.



SOFT-SHELLED TURTLE.
Under side.

OUR MOST IMPORTANT FUR BEARER.

THE muskrat has not yet been added to the collections of the Aquarium, but being an aquatic animal of convenient size there is no reason why it should not have a place there.

It is not its size nor the value of its pelt, but its sheer abundance which makes the muskrat our most important fur bearer; it predominates in the fur trade not by quality but by quantity.

A report on furs sold by Lampson & Co., of London, during the year 1909, states that they handled during the year, 2,892,000 skins of "musquash," which is the fur trade name for the muskrat. From publications of the United States Fisheries Bureau and from other sources, it appears that the annual yield of muskrat skins is considerably in excess of five millions, about one-quarter of the catch being made in Canada where it is generally known by the Indian name "musquash."

The yield may in fact exceed six millions, as recent advices from Louisiana indicate a catch for that state of probably more than a million skins during the year.

The muskrat, (Fiber zibethicus), is a North American animal, abundant in nearly all marshy and well-watered regions from Virginia and the Mississippi Valley, northward to Labrador and Alaska. Although it bears one of the cheapest pelts, its great abundance makes it very important—exceeding any other species by more than a million skins.

It is principally used for imitating fur seal, the hair being plucked which exposes the soft under fur, but it does not wear as well, the fur having a tendency to become matted down. The so-called "electric seal" of the fur trade is made of muskrat skins. "French seal" is another name applied to the muskrat counterfeit. It is often dyed to imitate other furs of a higher price and has long been in great demand for coat linings and trimmings.

Judging from the prices of the Lampson sales catalogue, the average value in the market appears to be less than fifty cents, but the price received by trappers in the United States would probably range from ten to twenty cents apiece. Skins from Nova Scotia, New Brunswick, Maine, New York, Michigan and Wisconsin bring a higher price. Black skins which are quite common are more valuable than those of the normal brown color.

The muskrat flourishes quite as well in the great salt marshes of the Atlantic Coast, as it does in fresh water marshes in the interior. A large proportion of the United States catch is made in New Jersey, Delaware and Maryland.

Recent inquiries by the United States Bureau of Biology show that muskrat trapping is a very important industry in this region, Dorchester County, Maryland, alone producing about 250,-000 skins in 1909. Along the eastern shore of Maryland the marshes are regularly leased for such trapping.

The muskrat is a cleanly animal and a vegetable feeder, subsisting largely on roots of water plants such as lilies and calamus. It is not known to consume much animal food except fresh water mussels. During canoe trips on the upper Delaware River I found numerous small heaps of mussel shells on the rocks along the shore, showing where the muskrats had been feeding. On one evening I observed a group of muskrats diving persistently in shallow water mear the shore and on the following morning found there a large bed of fresh water mussels.

In most localities where the muskrat is taken in abundance, the flesh is used extensively for food.

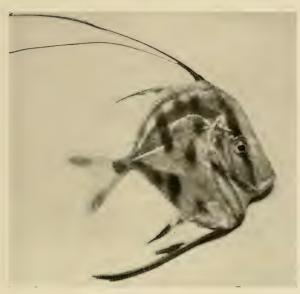
It is captured chiefly by means of steel traps. Spears are used to a considerable extent, being driven through the tops of their mound-like houses which may be found all about the marshes. Many are taken by shooting but this injures the value of the skin.

It is a very prolific animal, breeding several times a year and having from three to twelve at a litter, which accounts for its wonderful abundance. The aquatic and nocturnal habits as well as the fecundity of the muskrat serve to protect it. Man is its principal enemy, but it is preyed upon to some extent by minks, otters and owls. In some states where its capture is important, it is protected by law for a portion of the year.

It is rather abundant in the lower courses of the Yukon, Kuskokwim and other Alaskan rivers and I have seen muskrats in the Kowak River above the Arctic Circle. The natives use the skin to some extent for clothing.

Although restricted to North America the importance of the muskrat to the fur trade should warrant its introduction into the marsh lands of other northern countries especially Europe, where the sale of muskrat skins is very great. In most localities it is harmless and unobjectionable, but it causes some loss to real estate by burrowing in the banks of streams and is quite troublesome for this reason along the banks of canals. Its introduction into Holland would not be appropriate.

The writer has recommended its introduction into the fresh water lakes of the Pribilof Islands where there are 300 resident natives of Alaska employed in the taking of fur seals. If there were muskrats on the islands, their capture



THREAD FISH. Photo by F. W. Hunt.

would furnish some employment to the natives during the season when there is no work available; the skins would represent considerable value, and the flesh would be available as food. The muskrats would also furnish a supply of food to the blue foxes, which are taken there in abundance for their very valuable skins. The natural food supply of the foxes has always been limited at certain seasons of the year. As the muskrat could do no harm in any way, the Bureau of Fisheries has favored the plan of introducing it.

A large muskrat is about two feet from nose to the end of the tail. The tail is hairless and flattened laterally; it may be useful for swimming but so far as I have observed, the swimming is done with the hind feet, without any motion of the tail.

Like the groundhog, the muskrat is credited with being a prognosticator; when muskrat houses in the marshes are built larger and stronger than usual, it is said to indicate a severe winter. An ordinary sized muskrat house is about five feet in diameter and projects from two to four feet above the water. Its doorways are all under water.

PRIVATE AQUARIUM.

A letter has just been received from Capt. J. A. M. Vipan, who has a private fresh-water aquarium at Stibbington Hall, Wansford, England. states that there are sterlets now living in the building which were received in 1888; golden orfe and mirror carp received in 1883: Protopterus (the African dipnoid fish) received in 1897 and other interesting species. These are probably the best records in existence for fishes in captivity. The temperate tanks are unheated except in winter; the warmwater tanks are kept at 75° to 78° Fahrenheit. Capt. Vipan has also had remarkable success in breeding exotic species in captivity.

THE THREAD FISH.

NE of the most grotesque of the fishes which visit our shores in the summer time is the thread fish, (Alectis cilaris). It is a southern form, generally common in Florida and large specimens are used for food.

In the young the dorsal and ventral fins are excessively elongated and filamentous but become shorter with age. In some specimens the filaments keep growing even after portions have been broken off, sometimes being about twice as long as the fish itself.

The thread fish is wonderfully iridescent and presents a variety of rainbow tints as it changes position in drifting about the tank.

A few specimens are taken in the lower part of New York Bay nearly every summer, some of which come to the Aquarium. The species lives well in our tanks during the summer, but has not yet been carried through the winter.

No specimens have been secured since the new water system was put into operation at the Aquarium, and it is hoped that the coming summer will bring specimens which can be kept to better advantage than heretofore.

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ENLARGEMENT OF THE AQUARIUM BUILDING.

The year 1909 brought to the Aquarium 3,803,501 visitors—an average of 10,417 a day. Every year shows an increase, and the total attendance for the past thirteen years exceeds twenty-five and one-half millions.

The Annual Report of the Zoological Society, now in press, contains plans for an enlarged building, which is greatly needed. The number of people visiting the Aquarium is greater than that of all the other museums of the City combined, and there is every reason to believe that it will continue to increase. The time has come for a larger building, and the Aquarium should be given its rightful place among our institutions as a great marine museum. It should be large enough to contain three times the number and variety of aquatic forms it now contains, and should have a scientific staff capable of doing properly the museum work already being demanded of it by the people.

The Director with the aid of a single stenographer finds himself unable to attend to the correspondence, office and museum work thrust upon him. The Aquarium should be enlarged, should have a staff of curators, and be given the common facilities for museum work that are freely granted to the other museums of the city.

These important matters are set forth in detail in the Annual Report, and their careful consideration is urgently recommended to the members of the Zoological Society and the citizens of New York.

CAN WE SAVE THE FUR SEAL?

The American fur-seal herd breeding on the Pribilof Islands in Bering Sea, has been shrinking in size and commercial value ever since the business of pelagic or ocean sealing came into really active existence, about 1880.

A careful census of the herd made on the islands last summer by the Bureau of Fisheries, shows that there are about 150,000 seals of all ages remaining, the important class of breeding females numbering about 50,000. The census of 1897 revealed 150,000 breeding females.

The cause of the decline has been the continuance of pelagic sealing, which is destructive to the mother seals, and results in a further loss of equal numbers of young by starvation.

For some years after the regulations of the Paris Award, restricting the operations of the pelagic sealing fleet, within a zone of 60 miles of the Pribilof Islands, were put into operation, the decline in the seal herd was comparatively slow, although certain.

More recently a fleet of Japanese vessels has been engaged in sealing close to the territorial limit of three miles from the islands, Japan not being a party to the regulations framed by the Paris Arbitration.

This has resulted in transferring our long standing pelagic sealing problem from Canada to Japan, while the advance of the seal killing line from the 60 mile limit to the immediate vicinity of the breeding grounds of the seals, has accelerated the rate of destruction of seal life.

United States vessels have long been prohibited from engaging in pelagic sealing.

The large catches formerly made at sea by vessels, and on land under Government supervision, can no longer be made. Canadian vessels have largely withdrawn from the unequal contest with Japanese vessels, and the Government land catch of surplus, non-breeding males, has dwindled to a paltry fourteen thousand in 1909. Twenty-five years ago the island catch of surplus males was 100,000 a year without detriment to breeding stock. Pelagic sealing has caused us losses, in one way or another, of at least twenty millions of dollars.

As the supply of first-class sealskins is now so small, the very business of manufacturing sealskin garments is likely to die out, and the expert workmen engaged in it be scattered, to the great detriment of the fur trade. If sealskin garments should pass entirely out of fashion, it would take many years to train new workmen and to re-introduce the fashion.

If the cessation of pelagic scaling can be brought about without delay, it will be possible to preserve the very special art of sealskin manufacture, as well as the seal race itself.

It is the small catch of prime skins of surplus male seals from the Pribilof and Commander Islands that is keeping the industry alive, the pelagic catch being inferior in many ways.

The fur-seal is a highly polygamous animal, which habit naturally results in a large surplus of males. It is from the "bachelor" class of surplus males, that the catches on the Pribilof and Commander Islands have always been made by the United States and Russian governments, respectively. The utilization of the surplus males involves no more injury to the separate and distinct class of breeding seals than the utilization of the surplus male animals would on a cattle ranch, which is none at all.

With sealing vessels actively destroying female seals, the surplus male life would, if not removed and utilized at maturity, fill up the breeding grounds with an unnatural preponderance of mature males, destroying both females and young by their furious fighting. This is a zoological fact. There could of course be no injury to the herd itself by a cessation of land killing, provided there be a cessation of pelagic killing of females at the same time.

The habits of the fur-seal have been studied exhaustively for years by many of the foremost zoologists of the country, whose views are unanimous respecting the surplus male life of the breeding grounds.

The fur-seal herds can be saved only by the immediate and complete suppression of pelagic sealing. No restrictions upon the killing of surplus males on land can be of any benefit to the herds. On the other hand, there would be a loss of revenue to the Government, a loss of

prime skins now serving to keep alive the fur dressing industry, a loss of occupation for hundreds of resident natives on the islands, and a larger catch of damaged pelts by pelagic sealers, whose suicidal industry is on its last legs.

The whole matter of the fur-seal industry, including the administration of the seal rookeries on the Pribilof Islands, as well as the workings of the pestiferous pelagic sealing business, is receiving the most careful consideration at the hands of the officers of the Bureau of Fisheries and the advisory Board of the Fur Seal Service. It is in the hands of men who understand the matter in all its details, who have had personal experience with it both afloat and ashore—on the vessels and on the seal islands—and who are moreover familiar with the international aspects of the subject.

At a meeting in Washington on November 23, 1909, various recommendations were made, on each of which there was unanimous action. While these recommendations included some changes in the administration of the islands, there was no uncertainty about the attitude of the meeting on the subject of pelagic scaling, which is alone responsible for the diminution of the seal herd.

The pelagic sealing question is unfortunately one of jurisdiction over the high seas, and requires international action. Any nation could engage in it. Urgent recommendations for its suppression have been made to the Department of State, and everything depends upon the success of the international negotiations now being conducted.

With Great Britain and the other governments concerned, the Bering Sea controversy is no longer a matter of maintaining pelagic sealing, the fatal destructiveness of which they all recognize, but one of rights on the high seas. Whenever we recognize those rights in full, and announce our readiness to pay for their withdrawal, the sealing fleets will be called off. If we had done this twenty years ago, we would have saved money and long since restored our seal herd to its normal size. It is up to the State Department.

AN AQUARIUM IN INDIA.

"Nature," a weekly journal of science published in London, announces that a marine aquarium has just been established at Madras, India. It is described as being of small size and stocked with marine species from the adjacent coast. It is equipped with glass-fronted tanks, a reservoir, filter, aeration plant, elevated eistern and one large open pool.



HARBOR SEALS.

RARE TROPICAL SEALS.

THE West Indian seals which were received at the Aquarium in June, 1909, still constitute the most noteworthy exhibit in the building.

The possession of three flourishing specimens of a large species near the verge of extinction, is a fact both interesting and important. These seals are the only ones of their kind on exhibition anywhere and may be the last that will ever be seen in captivity.

In the time of Christopher Columbus, this seal was abundant in many parts of the West Indies, its range extending eastward from Yucatan to the Bahamas, Hayti, Cuba and Jamaica. It was gradually exterminated for its oil and skin, and is at the present time known to exist

only on the Triangle and Alacran reefs off Yucatan.

The West Indian Seal, (Monachus tropicalis), is closely related to Monachus albiventer of the Mediterranean, the seal of the ancients, a living specimen of which was exhibited at Marseilles in 1907. Both species are nearly exterminated and with their disappearance the genus Monachus will be classed with the extinct animals.

The Aquarium seals will not live forever, and by the time they are gone the man with the gun will more than likely have finished off the remnant of the race in Yucatan. Our seals have not posed to the best advantage for the photographs reproduced in the present BULLETIN, represent so far as we know the only ones in existence of the living animal.

The photographer has been requested to try again, so that the scientist of the future may have all possible documentary evidence as to the general appearance of the animal in life, and its actual existence as late as the year 1910.

These seals, an adult male and two young, are not altogether pleasant as near neighbors, their harsh voices penetrating to every part of the building. The West Indian seal is, so far as our experience goes, the only member of the *Phocidae* or earless seals, that uses its voice in captivity.

The two young seals, a male and a female, have been growing amazingly during the nine months of their life in the Aquarium. They take a fair amount of exercise in the pool, but after being fed usually haul out on the platform along with the large male for a nap, all three huddling close together.

The big male amuses himself occasionally by tossing a flipperful of water in the faces of visitors, with the same effect as his predecessor (a



WEST INDIAN SEALS.



WEST INDIAN SEAL.

seal of the same species, formerly kept at the Aquarium) used to accomplish by blowing water from his mouth.

THE SWELLFISH AND ITS INFLATING HABIT.

THIS fish, (Spheroides maculatus), inhabiting our coast from Massachusetts to Florida, is often abundant in New York Bay in the summer time, and the tanks of the Aquarium usually contain specimens of both the adults and the young. It is the only species of its genus to be found outside of the tropics and is known by several names, the commonest of which are puffer, swellfish and blower.

All fishes of this family have the habit of rising to the surface when disturbed by their enemies and rapidly filling the stomach with air so that they float about on the water, belly uppermost. The fishes distend themselves to such an extent that they become almost globular in form. One local species of the puffer family (the common spiny boxfish) inflates itself until its fins and tail appear to be mere excrescences upon an animated globe. When inflated and floating, these fishes are often driven ashore by the wind, where they die and slowly become dried in the inflated condition.

The habit is without doubt a protective one. When hooked by the angler and drawn to the surface, they are sometimes found to be tightly expanded with water. The inflated condition can usually be produced in Aquarium specimens by merely lifting them from the water with a dip net, the fishes continuing to suck the air until the stomach is distended to its utmost capacity. The air is retained by a valve in the throat and is usually discharged instantly when the fish is returned to the tank.

At rare intervals these fishes have been observed to inflate themselves with water while in their tanks at the Aquarium, without disturbance of any sort. It is quite possible that the habit of inflating with water under natural conditions is more common than is imagined.

Pictures in this BULLETIN show the fish expanding itself with air while being held in the hand and doing the same with water while in an aquarium. The picture showing the fish expanded with water is especially interesting as it is so rarely seen among captive specimens. Certain large species of puffers are inflated, dried and made into lanterns by the Japanese.



SWELLFISH INFLATING UNDER WATER.



SWELLFISH INFLATING OUT OF THE WATER.

The puffing practice is quite as common in the very young fishes as it is in the adults.

Puffers are not used for food and the flesh of some species is known to be poisonous. Ordinary teeth are lacking in the puffers, the jaws being armed with heavy parrot-like beaks. They are rather active in the tanks, the young especially so. They often bury themselves in the sandy bottoms of the exhibition tank with only the eyes exposed. At such times they are pale and colorless and would scarcely be noticed in the sand where they lie, if it were not for the protruding eyes. On being disturbed the whole upper surface of the fish instantly becomes dark, mottled with still darker spots, while along the sides of the body six or eight vertical blotches of black appear.

The swellfish attains a length of about eight inches, and spawns in this region early in June. A month later the young become exceedingly abundant along sandy beaches. It is a migratory species and departs on the appearance of cold weather.

ITEMS OF INTEREST.

Aquarium Tablet.—This tablet was placed on the Aquarium building on September 25, 1909, as a historical contribution of the New York Zoological Society to the Hudson-Fulton Celebration.

American Fisheries Society.—The Fortieth Anniversary Meeting of the American Fisheries Society will be held at the New York Aquarium, September 27, 1910. Everything possible is being done to make this a notable gathering of men who are interested in fish culture and commercial fisheries.

Skylights.—The work of placing several new skylights in the Aquarium is now being completed, and the effect is apparent in a decidedly better illumination of the main floor exhibits. The collection of seals, sea turtles, alligators, fresh-water turtles and invertebrates in small aquaria can be viewed to much better advantage.

Black Sea Bass.—Mr. M. G. Foster, a member of the Zoological Society, has presented to the Aquarium a large mounted specimen of the black sea bass, (Stereolepis gigas), taken by himself at Santa Catalina Island, California. The fish is nearly six feet long, weighed 250 pounds when captured, and was landed in the boat in forty-five minutes after being hooked.

This is one of the very large sea fishes often caught with rod and reel in that locality. Specimens have been taken weighing 700 pounds. It is an important food fish, common along the southern coast of California.

The Aquarium Society.—Sometime ago "The Aquarium Society" was granted permission to use the laboratory of the New York Aquarium for its monthly meetings. This Society is made up of persons interested in the keeping of small aquaria, and several of the members have contributed interesting fresh water forms to our collections. At the meeting held January 28, 1910, Dr. Louis Hussakof of the Museum of Natural History gave an illustrated account of the Aquarium at Naples. Teachers in the public schools who are interested in the subject of school aquaria have been invited to attend the meetings.

Correspondence.—The New York Aquarium, like other museums, carries on a considerable correspondence with the public at large. Occasionally a letter is received which is too rich to be lost in the files.

A letter received from Ulster Co., New York, says: "The dam on my place is broke and the water is all run out. We have fix the dam and want some more fish. Pleas attend to this at once."

Another letter from nearer home, inquires: "Are you troubled with rats? If so my method of killing will clean them out."

The answer was: "The Aquarium has plenty of rats but we do our own killing or rather the alligators do it. If you care to empty your traps into our alligator pool you will see rats killed with neatness and despatch and nothing left for the garbage can."

A Large Lobster.—On February 22, 1910, the Aquarium received a lobster weighing sixteen pounds, or a pound and a half more than the giant lobster received in January, 1908, and



BRONZE TABLET ON THE WALL OF THE AQUARIUM.

described in the April number of the Zoological Society Bulletin for that year. It came from the coast of New Jersey. Big lobsters are rare in these days of excessive lobster fishing. According to Professor Herrick, author of an important monograph on the American lobster, twenty-five pounds is the limit of size attained. A large lobster taken off Atlantic Highlands, New Jersey, in 1897, and brought to the Aquarium, is recorded to have weighed thirty-four pounds. This specimen is now in the American Museum of Natural History, and its size indicates that the weight recorded is not far from correct. Some of the largest lobsters taken during recent years have been found off New Jersev. This is doubtless due to the fact that lobstering is but little practiced so near the southern limit of the lobster's natural distribution. and the small numbers existing there have a chance to grow.

Dear Mr. Aquarium: A fair correspondent of the "New York World" lately visited Florida and thinking that I possessed every necessary and comfort of this life except a live alligator, sent me one which I am forwarding to you under separate cover. While the lady's intentions were of the best, her conclusions were wrong. I really do not need an alligator this winter. Another reason for parting with my gift is that affairs in this office may resume their normal business level and the lady clerks do their work

sitting in their chairs instead of standing on them.

As to a name, he has been called "Frankie" for the week he has been with me, but this is not to be considered as binding upon you. If your experts decide that the name is inappropriate call her "Josie."

The specimen was a c-cepted and the following answer sent to the donor:

Please accept my thanks for the specimen of Alligator mississippiensis which you have been so kind as to send to the Aquarium. Be pleased also to accept my thanks for your sprightly letter of transmittal which you

will pardon my saying, is worth more than the

The Aquarium gets a million or two baby alligators a year from returning Florida tourists, but there is of course always room for a few more. When they get too thick, we send 'em back to Florida for the restocking of depleted waters, as alligator leather is becoming scarce owing to the activity of the above mentioned tourists.

The name is no longer a matter of importance as we ran out of names so long ago that the clerk's "Accession number" serves the same purpose, hope that the lady clerks in your office are now enjoying freedom from alarm.

Young Sea Horses.—As an illustration of the importance of pure sea water to an aquarium, the keeping of the common sea horse will afford a good example. A few of these fishes procured a year and a half ago, after the new water system was placed in operation, lived more than a year, and one still survives. They were all young specimens of less than two inches in length when received.

Early in April of last year some of the females spawned, depositing their eggs, after the manner of these fishes, in the brood pouches of the males, after which the females died. On April 22, three of the males liberated from their pouches from 150 to 200 young, each. Every effort was made to supply the young with natural food but without success, none of them surviving longer than two weeks. One of the

parent males is still living and has reached a larger size than any sea horse ever kept in the Aquarium, being six and a half inches in length.

Our observations appear to indicate that the female sea horse arrives at maturity in less than one year, and dies after the first spawning.

The latter point is of course not yet demonstrated, but a hundred more small sea horses procured during the past summer, have grown rapidly and will afford ample material for further observations as to breeding habits next month.

THE OCTOPUS.

UR efforts to acclimatize the octopus in the Aquarium have not been crowned with suc-

cess. Specimens have been brought from Bermuda each summer, only to be lost within a few days. It was believed that the new system of pure sea water would make the conditions of captivity for the octopus, such, that our trouble would come to an end, but the experiences of the past summer showed that the hope was in vain. In the tanks of the Bermuda Aquarium, the octopus lives and thrives as well as it appears to do at Naples, and our specimens have been derived from stock inured to captivity in Bermuda. Our stored sea water is pure and is kept at the proper temperature, while our specimens have been supplied with live crabs, just the kind of food they like. They have been carried in large transportation tanks on the steamer, supplied with flowing sea water during the voyage and have been under the care of Mr. Mowbray who has had abundant success in keeping them in captivity in Bermuda.

As most of the animals of each shipment died during the voyage, and the survivors arrived in New York too weak to feed, it is now apparent that the cause of the trouble lies in the system of transportation.

Fishes brought to New York from Bermuda usually arrive in good condition, and losses on board the steamer are trifling. The difficulty

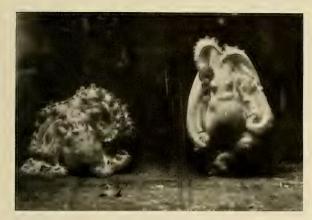


OCTOPUS IN THE NEW YORK AQUARIUM.
The picture shows a weakened specimen.
Photo by L. B. Spencer.

may rest with the galvanized iron shipping tanks, which while satisfactory for fishes, may be all wrong for the octopus. The fish remains suspended in its natural element in the tank, but the octopus clings with all its suckers to the sides. It is possible that it thus absorbs something injurious from the metal walls of the tank, and in view of this possible source of injury, the next season's shipments will be made in wooden tanks painted with asphaltum, which has been found a safe coating for wooden troughs used in the hatching of fish eggs.

The octopus is a prize exhibit in any aquarium where it is kept, and should be represented in our collections—especially as there is no serious difficulty about the capture and feeding of specimens. With live spiny-lobsters, crabs or mussels as bait, it is often taken in the large wicker fish traps used everywhere in the West Indies, but in Bermuda it is usually captured by divers, who seize it with their hands. The use of the fish-trap requires time, and the octopus may be killed by morays or rock fishes entering the trap. It would not venture into a trap already containing any large fish.

It is frequently caught with hook and line, but when hauled up clings so tightly with its



OCTOPUS IN RESTING POSITION.

One specimen white, the other changing color.

Photo by L. L. Mowbray.

sucker-covered arms to the side of the boat that it cannot be loosened without injury.

The hiding place of the octopus is discovered with the aid of a water glass which renders objects on the bottom quite distinct at a depth of two or three fathoms. This contrivance, used by fishermen generally in the West Indies, is nothing more than a box or bucket with a bottom of glass. Placed on the surface of the water alongside the boat, it is easily managed by inserting ones face in the open top. The lair of the octopus is indicated by the scattered shells

of mollusks or crustaceans, such as oysters, clams, mussels, scallops, spiny lobsters and crabs of many kinds lying in front of it. The animal carries most of its food to its hiding place, and the quantity of rejected shells thrown in front of it forms a conspicuous mound sometimes a yard in diameter and a foot in height.

In capturing the octopus alive, the diver thrusts a handful of salt wrapped in dough into the hole occupied as a hiding place.

The immediate softening of the dough envelop liberates the salt, which irritates the animal causing it to dart out, when it may be seized with the hands. The diver wears a bathing suit and holds the octobus against his breast with one hand as he swims up to the boat. being careful not to injure it by getting his fingers under the edge of its mantle. The animal of course takes hold of the man with its arms, but the diver is not bitten. Contrary to general belief the octopus, at least when of ordinary size, although armed with a formidable parrot-like beak, is perfectly harmless, never attempting to

The octopus does not discharge the contents of its ink bag until after it

has darted from its lair. It attempts to retreat under the cover thus afforded, which is sufficient to cloud the water for a couple of feet. While occupying its lair it has the habit of clearing the entrance of any small objects that may be thrown there, by a discharge of water from its siphon. When disturbed it gathers the nearest empty shells, which adhering to the strong suckers of its arms, are used as a shield to guard the entrance. Ordinarily it lies quite out of sight, except for one arm held over its eyes, ready to seize prey or protect the entrance. When un-



OCTOPUS ATTACHED TO THE GLASS FRONT OF THE TANK BY ITS SUCKERS.

Photo by L. B. Spencer.



THE AQUARIUM BUILDING IN 1871.
From the painting by Edward Moran in the Fairmount Park Museum, Philadelphia.

der cover in this position the eyes are forward, the body and the other arms being behind. The immediate vicinity of its hole is kept clear of debris for about six inches.

While the water glass is necessary in searching for it in deep water, the animal sometimes lies in a pool between tide marks, hidden of course under a ledge, and its shell heap then may be entirely out of water at low tide.

The large Bermuda crayfish or spiny lobster greatly fears it, and the fishermen can drive a hiding lobster from its hole by placing a dead octopus near it. It does not attempt to carry home a large lobster, but making an opening under the side of the carapace, cleans the flesh out entirely, leaving the empty shell intact.

The octopus is also a crab eater, and frequently pursues a crab entirely out of water, following it over the rocks for several feet. When live crabs are thrown into the tank of a captive octopus, they are seized by the suckers on the arms and drawn under the web which connects them at the base. Several crabs may be stowed away under the web together.

In captivity, and doubtless in nature also, the octopus is more active by night than by day. In Bernuda the octopus is sometimes found large enough to measure seven feet across the outspread arms, but those of the ordinary size that come to the Aquarium, measure little more than four feet in expanse.

The octopus sometimes attains a much larger size, and West Indian specimens have been recorded with a length of nine feet and a weight of sixty-eight pounds. A species on our Pacific Coast reaches a length of sixteen feet, or nearly twenty-eight feet across the outspread arms.

While octopi are known to be timid creatures, there is probably no reason why very large specimens should not be dangerous to man, although authentic cases of unprovoked attacks are lacking.

THE AQUARIUM BUILDING IN 1871.

FROM time to time the Bulletin has reproduced old prints or other pictures of the Aquarium building. This structure dating back to 1807 and successively known as "West Battery," "Castle Clinton," "Castle Garden" and the "Aquarium," possesses for many persons a decided historical interest.

The picture presented in the present number is from a reproduction of a platinum print, of the painting by Edward Moran in the Museum of Art, Fairmount Park, Philadelphia. It shows the building in its Castle Garden stage, shortly after the extensive filling-in of earth which brought it within the limits of Battery Park. According to Mr. Thomas Moran, the painting was made in 1871 or 1872, prior to the building of the present sea wall.

ENDOWMENT FUND.

THE Executive Committee of the New York Zoological Society has decided, in order to insure the permanency of the Society's work in the Zoological Park and in the Aquarium, to establish an Endowment Fund, the income of which will be available for the uses and purposes of the Society; \$350,000 are needed at once, and the Committee has determined to ask for six donations of \$25,000 each; ten donations of \$10,000 each, and twenty donations of \$5,000 each. The following letter has been prepared, signed by the officers and Executive Committee and was sent out to the friends of the Society in the latter part of February:

"The Endowment of the New York Zoological Society is necessary to give permanence to the great work which it is conducting for the education and civilization of the City of New York. The visitors for the twelve months to November 1, 1909, are: Park, 1,620,582; Aquarium, 3,739,-133; a total of 5,359,715.

"The creation out of a wilderness, in the short period of ten years, of a Zoological Park which is unequalled in the world, and the establishment of an Aquarium which is also without rival, are unparalleled achievements which are entirely due to liberal appropriations by the City of New York and to the intelligence and public spirit of those members of the Society to whom the management of these great institutions has been entrusted. The Society itself, by annual contributions of \$171,520, and by outright gifts to the Park of \$316,594.60, has munificently supported these undertakings and loyally stood behind the management. The total annual income from membership dues is insufficient to carry on all the executive, administrative, scientific and artistic work which the Society has contributed to make the Park and the Aquarium the institutions they are. None of this is paid by the City.

"The Executive Committee has, therefore, determined to raise an Endowment Fund similar to that which makes permanent the work of the American Museum of Natural History, of the Metropolitan Museum of Art, and of the Botanical Garden.

"Pending the raising of an Endowment, which should amount to not less than \$1,000,000, one hundred members of the Society, in addition to their previous gifts, have enrolled themselves as Sustaining Members, contributing \$4,000 a year for five years, or until such time as the Endowment Fund can be raised.

"It may be supposed that the other institutions of the city as well as the exhibitions in the Park itself, are doing all that should be done toward public education and enlightenment along these lines, but there are three especial grounds for this undertaking by the New York Zoological Society.

"First.—Permanence of the Society, and thus of the Park and Aquarium, when the present initial enthusiasm wanes through the loss of members.

"Second.—Scientific Exploration and Publication, such as is conducted by other similar societies in other parts of the world.

"Third.-PROTECTION OF ANIMAL LIFE, as the Society's part in the great conservation movement which is going on not only in the United States, but in all parts of the world.

"You are invited to contribute to Endowment either by an outright subscription, or by a subscription conditioned upon the raising of \$250,000 during the coming fiscal year."

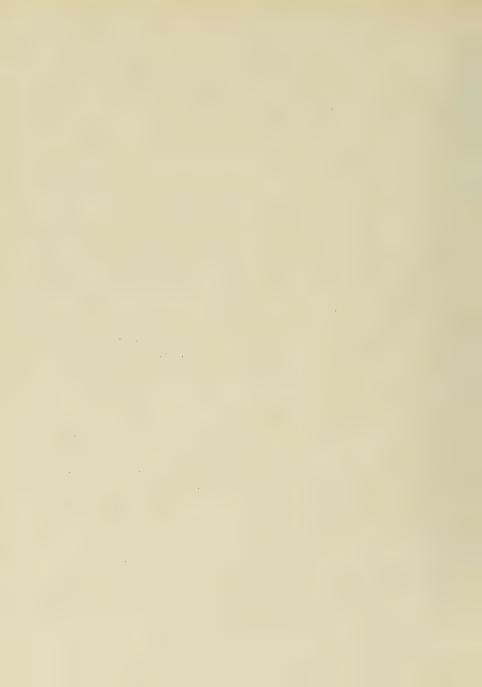
The Committee has the satisfaction of reporting that up to the present date subscriptions have been received as follows:

Of the six \$25,000 subscriptions needed, two have been received.

Of the ten \$10,000 subscriptions needed, four have been received.

Of the twenty \$5,000 subscriptions needed, eight have been received.

The Committee hopes that the members and friends of the Society will aid in raising the needed Endowment Fund.



ZOOLOGICAL SOCIETY BULLETIN

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PHOTOGRAPHING THE BEAR CUBS.

T has again been forcibly illustrated that wild animal photography, if carried on in a way to secure perfect results, is a very hazardous pursuit.

During the winter our female Russian brown bear has been exhibited in one of the outside cages of the Lion House, while repairs have been going on at the Bear Dens. During her stay at the Lion House, on January 18, she gave birth to a litter of three fine cubs, making the fourth litter from this mother while she has been exhibited in the Park. Owing to restrict

ed cage accommodations at the Lion House, Mr. Sanborn was unable to obtain good photographs. "Caché" and her cubs were moved down to the Bear Dens on April 26, during a day of brilliant sunshine, and Mr. Sanborn immediately took advantage of the perfect weather conditions for photographing the mother and her young.

With Keeper Richard Spicer, he entered the den, provided with a large "reflecting" camera, and obtained several pictures of the bear family,—some of which are herewith shown.



RUSSIAN BROWN BEAR "CACHÉ."

This picture was taken immediately before "Caché" attacked Keeper Spicer. The three cubs are standing in the opening of the shelter, into which "Caché" afterwards tried to drag the keeper.

"Caché," up to that time a uniformly good-natured bear, with or without cubs,—spent many minutes in picking up the peanuts that were thrown to her by Spicer, as he endeavored to thus entice her into the best lighted portions of the cage.

Without warning, she suddenly rushed at Spicer, knocked him down, seized him by the left forearm and at once started to drag him into one of the sleeping-dens. Mr. Sanborn, recovering from the momentary surprise, dropped his camera, rushed for a club which had been taken into the den and was leaning against the bar-work, and with it dashed back to Spicer's assistance. By that time "Caché" had dragged her keeper almost into the door of the sleeping-den. Mr. Sanborn belabored the bear over the head with the club so vigorously that she quickly released her hold of Spicer, and backed into her sleeping quarters.

Without waiting for assistance from without, Mr. Sanborn gave instant attention to the keeper's badly lacerated forearm, which was bleeding freely. As quickly as possible he tied his hand-kerchief around the injured arm, and with the flow of blood well checked, assisted the keeper to the gate. By that time the door of the den had been unlatched, and one of our soda-fountain attendants, William Kansky, after arming himself

with a club, pluckily rushed in and rescued the camera.

Mr. Sanborn's brave attack upon the infuriated "Caché" undoubtedly saved Keeper Spieer, for the bear evidently intended to drag the latter into her sleeping-den. It was a case of brave action, without a second's loss of time, and, as stated before, demonstrated the danger of entering the enclosures of wild animals, even for an experienced keeper like Spicer, who knew the animal well and was known by her, and who had entered her cage on many previous occasions. In a previous accident, Mr. Sanborn was the victim, being hurled to the ground by an infuriated llama, and in an attempt to rescue the camera had his upper lip completely split by coming in contact with the lens barrel.

Keeper Spicer was immediately removed to the Fordham Hospital, where he is receiving every attention at the hands of Dr. Alfred S. Taylor, operating surgeon, and Doctors Pace and Black, house surgeons. The bite of the bear inflicted upon the keeper's forearm, two long, ragged lacerations, in which the two main arteries were destroyed. As a result of this, it is now feared that the thumb, and either one or two fingers, will be lost.

On the whole, the loss of the two blood-supplying arteries renders the results of this accident particularly distressing.

R. L. D.



"CACHÉ'S" THREE CUBS



SERIES OF RODENT-REPTILE CAGES IN THE REPTILE HOUSE.

AN ECONOMIC RODENT-REPTILE COLLECTION.

By RAYMOND L. DITMARS.

S an answer to an oft-repeated question-"Of what use are reptiles?"-a new feature that is being rapidly completed in the Reptile House, will serve several purposes. In the first place it will present for exhibition for the first time in the Zoological Park, an elaborate series of the small gnawing animals, or rodents, a great number of the species of which are highly injurious to the interests of agriculturists. Secondly, the exhibition will contain a large series of those species of snakes that prev upon the destructive rodents,-thus presenting for observation those serpents of marked economic value. Finally, the entire series will stand as a clear demonstration of the perfect scheme of Nature in which the production of all animal life is balanced; for a part of the exhibition will be cages containing representative species of those mammals that, in turn, prey upon the serpents, thus keeping even the destroyers of the smaller injurious creatures within bounds.

While this exhibition will be made a permanent feature, the character of the exhibits will be changed from time to time, as is the case with all of the smaller creatures displayed in the Zoological Park. During the present summer, both the injurious mammals and the reptiles of economic value will embrace species for the greater part inhabiting North America. This arrangement will be followed by an exhibition of Old World species. A few very striking Old World species will, however, be displayed during the present season.

The smaller injurious rodents or gnawing animals of North America are many and varied.

Of the Sciurida, the Squirrel Family, we have a very elaborate series comprising eighteen species on exhibition in the Small-Mammal House. In the present economic series of mammals and reptiles, the Sciurida is being limited to the exhibition of those species really injurious to agriculture. The tree squirrels, genus Sciurus, cannot be properly embraced under this head. While the habits of some species might be rated as not friendly to the farmer, the various spe-

cies have so rapidly decreased in number of representatives, that some of them are now actually protected under the game laws,-this provision relating particularly to the Carolina gray squirrel, (Sciurus carolinensis), it being now illegal to keep specimens captive other than in zoological institutions, for public exhibition. One well-known species of the tree squirrel group that is rated as injurious, is the North American red squirrel, (Sciurus hudsonicus). Several related species occur in the United States, Mexico and Central America. These smaller members of the group are notorious destroyers of birds' eggs, and the recently hatched birds in the nest. Whether or not their habits are injurious to man, owing to their bird-destroying inclination, is a subject for considerable study; for it is



SURICATE.



THIRTEEN-LINED SPERMOPHILE.

right here that we evidently note one of the phases of balance in animal life that we are endeavoring to illustrate in the exhibition of the animals under discussion.

The ground squirrels of the United States, together with the members of the Mouse and Rat Family, the *Muridæ*, stand as a positive menace to the agriculturists—some of them

constituting a menace to humanity generally. If these creatures were not kept in vigorous check they would literally overrun vast regions of the globe. The march of civilization has resulted in the marked increase of a number of species that thrive upon the products of tilled soil. The ground squirrels, forming a large

North American group, are particularly common in the western portion of the United States, where they are commonly called "gophers." They have also been grouped under the title of spermophiles,—meaning seed-lovers. This title is quite appropriate, as the vast majority of the species feeds principally upon grain and seeds. They live in burrows in the prairie country, some in actual desert regions, and in the great wheat belts are altogether at home, in the midst of plenty.

Of the spermophiles north of Mexico, there are thirty-one full species and forty-two subspecies. In the cultivated areas their most destructive habit is the digging up of seed grain. Yet it should be explained that some species eat quantities of destructive insects, such as grass-hoppers, beetles, cut-worms and crickets, and in this way partly compensate the farmer for the grain they devour. The ground squirrels or spermophiles are prolific, bringing forth seven to ten young in a litter. Their enemies are the

rodent-eating snakes, foxes, badgers, skunks, hawks and owls. Of these little animals exhibited in our series to demonstrate the destructive species and their natural destroyers, the thirteen-lined spermophile, (Citellus tridecemlineatus), is one of the smallest, though most widely distributed species. The pattern is striking and characteristic, consisting of pale yellow bands, separated by rows of yellow spots on a dark brown ground-color.

The Richardson spermophile, (Citellus richardsoni), of northern Montana, North Dakota and the region immediately northward as far as the Saskatchewan, is another of the ground squirrels in our special collection. It looks much like a miniature prairie "dog," except for the proportionally longer tail. It is notoriously

destructive to grain. Like a number of other species among the spermophiles, it passes the winter in a state of hibernation, during which period its blood circulation is greatly retarded, to such an extent, in fact, that a hibernating squirrel might be mistaken for a dead creature.



TERBOA.

As examples of mammals that constantly menace the welfare of mankind, owing to their persistent multiplication, our series of the destructive rodents necessarily embraces a number of species of the rats and mice, these representing the largest of the families among the rodents, or gnawing animals, the Muridæ. The common rat, (Mus decumanus), despite its insignificant size, must be rated as a distinctly destructive species, and one actually dangerous to man. With the gradual solving of



KANGAROO RAT.

the long train of puzzles that confront scientific workers, comes the decision that the appalling spread and the great difficulty of eradicating the deadly bubonic plague, are evils traced directly to that mean-tempered slinking creature that must be rated as one of the greatest pests of civilization. The decision is, that the rat is susceptible to plague infection, and is infested with fleas that are always quite willing to leave the original host, when the blood of the latter is well tenanted by the formidable bacilli, and add variety to their sanguinary instinct by biting members of the human family. The proboscis of an infected flea hypodermically transfers the plague culture to the human. Numerous reputable writers have emphatically explained that the multiplication of the common rat menaces the world, and, if left unchecked, would mean the annihilation of human life. And in the face of this, it appears unfortunate enough that many common enemies of the rat are being persistently persecuted and exterminated. Among these are the snakes, hawks and owls. The reptiles are of especial importance owing to their prowling and subterraneous habits. They destroy the entire litters of young rodents in the nests, and a single snake may perform the work of a dozen hawks.

While the ravages of the common rat may be rated as most formidable among the North American members of the Muridæ, the rice-field rat, the cotton rat and the wood rats are other rodents that Nature must keep in constant check for the good of the great general scheme of life. This also relates to the innumerable species of mice. The rats and mice are well represented in the collection to which this article relates, as well as those curious gnawing animals known as the pocket mice, (Heteromyidæ), and those ugly, strong-jawed creatures known as the pouched rats, or pocket gophers, Family Geomyidæ.

RODENT DESTROYERS.

In tiers of cages beneath those containing the rodents, we are now arranging the series of economically important serpents, the greater number of these North American species, for the opening of this display. As enemies of the common rat, however, which dangerous pest has

extended its domain to all parts of the world, will be shown a series of rat-eating serpents from various widely separated parts of the globe.

Among the North American serpents, one of the most useful species is the indigo snake, or gopher snake, (Spilotes corais couperi), a species confined to the southeastern portion of this country. It is a handsome, glossy, blue-black reptile, with a dash of red on the throat, attains a length of nine feet, and prefers rodents over all other prev. This fine and useful reptile should be protected by the state laws of South Carolina, Georgia, Florida, Alabama and Texas, for several species of rats, besides the omnipresent domestic species, abound in those states. The species ranges from Brazil northward through Central America, Mexico, thence into the United States; the range in the latter following the east coastal region. In Central America the valuable habits of this rodent-destroying reptile are well appreciated and the species is protected.

In the western United States are several large and powerful serpents belonging to the genus Pituophis. The bull snake,-also called the yellow gopher snake, (P. sayi), is the most widely distributed. It attains a length of eight feet and its color is yellow, with a chain of brownish dorsal saddles. It ranges over a great part of the country inhabited by the grain-destroying ground squirrels, where, together with hawks and several species of the carnivorous small mammals, it wages constant warfare against the small gnawing animals. The importance of the work performed by this serpent cannot be fully appreciated without due realization of the reptile's habit of entering the deep burrows of the rodents and destroying whole litters of young in the course of a meal.

Among the serpents of marked economic importance inhabiting the United States east of the Mississippi and northward into the New England States, is the familiar blacksnake, or racer, (Zamenis constrictor), which is a busy destroyer of mice. The "milk" snake, (Ophibolus doliatus triangulus), sometimes called the checkered "adder,"—is of great value to the



TYPE OF REPTILE CAGE. Economic Rodent-Reptile Series.

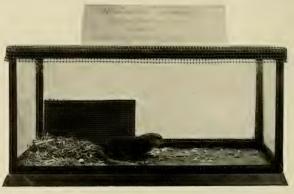
farmer. It never steals milk from the cows, and the reason why it so persistently haunts the neighborhood of the barns is to prey upon the small injurious mammals that collect in such places, and which constantly elude the traps of the farmer, who chafes under the constant annoyance of finding his grain sacks being gnawed full of holes, and his fodder riddled by mice, voles and rats.

The pilot blacksnake, (Coluber obsoletus), and the pine snake, (Pituophis melanoleucus).

are other economically valuable reptiles of the eastern states, and in the southern part of that region. Ranging from central North Carolina southward, we find the corn snake, (Coluber guttatus), and other species of the genus Coluber, the coachwhip snake, (Zamenis flagelliformis), besides a number of species of ground snakes that prowl into the burrows of mice and voles, and destroy the young. All of the serpents mentioned will be represented in our series of the snakes rated as of economic importance in this country, and moreover, all are absolutely innocuous. While the poisonous snakes are also constant destrovers of rodents, and assigned to the scheme of Nature for some specific purpose, it is of course imperative, owing to the advance of civilization and the danger man is exposed to in coming in contact with them, that they must go. The senseless slaughter of the harmless snakes, however, should be as effectively stopped as the wanton killing of birds. And

to counteract, if possible, a very silly prejudice that has prevailed in Nature since the tale of "Eve" and the "apple," was one of the suggestions in preparing the series under discussion.

To fully demonstrate that Nature has her own ideas in establishing a balance in animate creation, we will exhibit several species of snake-killing mammals. In the United States the chief enemies of the larger snakes in the wilds, are eagles, hawks and owls. In certain areas adjacent to cultivated regions, domestic



TYPE OF RODENT CAGE. Economic Rodent-Reptile Series.

swine are destroying all kinds of reptiles,particularly the useful species; which is not a part of Nature's plan. The natural enemies of the smaller snakes (the mouse-eating species), are skunks, weasels, otters and foxes. . The raccoon is also a snake-eater. While our economic series is new, we will present to our visitors the better known snake-killing mammals, in the shape of the mongoose, the kusimansé and suricate,-all Old World species that are notorious snake-eaters. While mentioning these animals, it is well to explain that these nimble creatures do not hesitate to attack the deadly species. While the general idea is to the effect that in their combats with cobras and vipers they are bitten, then, after the inevitable death of the deadly creature the courageous little mammal rushes off to some secret patch of shrubbery, gnaws on some wonderful leaves, and by so doing immedately counteracts the deadly effects of the poison, the truth of the matter is that these snake-fighters are seldom bitten. If such is the case, they die. Their motions are so wonderfully active that the snake is bewildered and is unable to strike effectively. The reptile's enemy dashes about it in circles, or cuts eccentric angles at such a speed that the attacking animal looks like a mere streak. Then there is a dash at the snake, a crunch of powerful jaws supplied with long, sharp teeth that penetrate vital parts, and the fight is over.

We hope that our economic series will be of interest and instruction to teachers and their classes, to agriculturists and many who have asked us about the possible value of snakes. The series will be supplied with descriptive labels, which will be duly elaborated according to the trend of questions coming from our visitors, a practice that we have always followed.

A NEW BUSHMASTER.

THE collection in the Reptile House has been enriched by the addition of an exceptionally fine example of the bushmaster, (Lachesis mutus), from the Island of Trinidad. Like all of our former specimens, about five in number, during the past ten years, the speci-

men was obtained through the courtesy of Mr. R. R. Mole and his son Mr. Howard Mole, of Port-of-Spain, Trinidad. These magnificent and deadly vipers, representing the largest and most formidable species of the New World poisonous serpents, are very delicate and nervous as captives. Adult captive specimens have never been known to feed, but it is our constant endeavor to make one of these reptiles feel enough at home to take food voluntarily. The present specimen has been given a big cage, with a generous bed of damp sphagnum moss, and a rustic shelf on which to climb.

The bushmaster, or "sirocucu," attains a length of twelve feet, and inhabits tropical America generally. It is boldly marked with inky black rhombs on a pale orange or pinkish ground color, with a scalation so rough as to suggest the surface of a pineapple.

Following is an interesting letter from Mr. Mole, describing the capture of our new specimen:—

"I send you per S.S. 'Marowipue,' sailing to-day, two Lachesis mutus, each about eight feet. They were both caught by the same man and in the same neighborhood, within two days of each other, and I believe them to be a pair. My father tells me that he has never had or seen two Lachesis mutus together at the same time and he thinks it an extremely rare occurrence, and the chances are that they will feed. I shall be glad to hear of any results of any experiments you make, and whether they can be made to feed.

"I am sorry to inform you that the price of *Lachesis mutus* has gone up. It is owing to the mongoose, whose destructive work is going on at a great pace. Our hunters say that they cannot catch poisonous snakes at the old price, as they are extremely rare, and the risk is too great.

"I regret to say that while the second and smaller snake was being bagged, he twisted and broke his neck, striking through the bag and squirting poison on my father's chin. I am, therefore, only able to send you one."

ZOOLOGICAL SOCIETY BULLETIN.

ELWIN R. SANBORN, EDITOR.

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Director of the Aquarium, Charles H. Townsend, Sc. D., Battery Park.

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Officers of the Aquarium

CHARLES H. TOWNSEND, Sc.D., Director. W. I. DENYSE In Charge of Collections.

ANOTHER DELAY.

The vicissitudes of the Administration Building continue to be prolonged. At present it is the furniture.

It was found that the necessary furniture, rugs and window draperies could be purchased only by a public letting to the lowest bidder.

After most painstaking consideration of every point involved, an elaborate series of designs and specifications was prepared and submitted to the Park Department. With all possible dispatch a contract was advertised, and bids were opened on April 14. Then a firm that failed to put in a bid, cheerfully filed a protest because

the specifications were not, in one small detail, worded to suit it; as a result, the Park Board threw out all the bids, thus making it necessary to re-advertise. In time—as compared with eternity,-we hope to succeed in getting a contract for our furniture actually awarded. After that Rubicon has been crossed, the goods will be expected in sixty days; but when they will be received, no one can say.

At present only one thing is certain; we will not secure our household goods, nor actually occupy our new offices, before autumn.

ENDOWMENT FUND.

The raising of the Endowment Fund is progressing substantially. Of the six \$25,000 subscriptions needed, three have been received; of the ten \$10,000 subscriptions needed, four have been received; of the twenty \$5,000 subscriptions needed, seventeen have been received, making a total of \$200,000.

At least \$250,000 must be raised before July I, 1910, in order to comply with the conditions upon which some of the foregoing subscriptions have been made. It is hoped that the members of the Society will aid the Executive Committee in securing the balance needed.

The following contributions have been either paid into the Treasury, or else subscribed in some cases conditionally upon raising \$250,000 prior to July 1, 1910:-

* / -	
Samuel Thorne	\$25,000
Jacob H. Schiff	25,000
George F. Baker	25,000
Est. Phoebe Anna Thorne	10,000
Cleveland H. Dodge	10,000
Ogden Mills	10,000
Levi P. Morton	10,000
Edward S. Harkness	5,000
Andrew Carnegie	5,000
Miss Emily Trevor	5,000
Samuel P. Avery	5,000
Frank K. Sturgis	5,000
John L. Cadwalader	5,000
Percy R. Pyne	5,000
George C, Clark	5,000
George W. Perkins	5,000
Lispenard Stewart	5,000
A Friend	5,000
Robert S. Brewster	5,000
Hugh J. Chisholm	5,000
Henry A. C. Taylor	5,000
George J. Gould	5,000
John D. Archbold	5,000
Frederick G. Bourne	5,000
F. Augustus Schermerhorn	1,000
Est. Marguerite Carter	100
E.	

NEW MEMBERS January 1, 1910-April 30, 1910.

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Agnew, George B.,
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Collier, Robert J.,
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MALICIOUS MISCHIEF CONVICTION.

During this spring, the officers and keepers of the Zoological Park have been specially on the lookout for a particularly malicious type of mischief-maker—the man who throws matches into the animal cages. The bedding in a cage was deliberately set on fire last summer, and a calamity was narrowly averted.

On Sunday, April 24, in the afternoon, during a heavy attendance in the Park, Keeper Engeholm, of the Primate House, discovered an offender of this type. Quietly notifying Policeman William King, the man was followed and observed while he repeated the offense. He was immediately arrested.

On being taken to the Bronx Park Station, the man gave his name as Abraham Lipsky, and his address as 724 East 5th Street. Lipsky was locked up at the Bronx Park Station.

Later on the prisoner was arraigned at the Jefferson Market Court. We quote from the New York *World* its record of what took place in the court:—

"When Lipsky was arraigned in the Night Court, Magistrate Herbert lectured him. * * * 'There have been two serious fires in the Zoo, and those animals, placed there for your instruction and pleasure, are too valuable to be played with by men like you.' Lipsky was fined \$10, and not having the money was sent to the workhouse for ten days." R. L. D.



HIPPOPOTAMUS.
Ghizeh Gardens, Egypt.

THE GHIZEH ZOOLOGICAL GARDENS.

THE Ghizeh Zoological Gardens are a delight to the lover of beauty as well as to the zoologist. Captain Stanley S. Flower, the Director, deserves the greatest credit for having brought order out of chaos, and with the able help of his assistant, Mr. Nicoll, is building up a most valuable and interesting collection of African animals. It would be well if a similar segregation of the indigenous fauna could be made in all zoological gardens, as it possesses a peculiar interest both for tourists and natives, more than the usual heterogeneous assemblages.

The Ghizeh Gardens cover an area of about fifty acres and were once part of an old palace garden. The beautiful mosaic walks and rustic bridges bear witness to this former use. A unique and enviable feature is the absence of all provision for cold weather. The cages of the birds and monkeys are open and portable. This makes it possible to remove an infected cage and replace it at once by a fresh one.

The vegetation is luxuriant and the animal and bird exhibits are so arranged that one comes upon them unexpectedly, this one partly concealed by a grove of plane trees, another aviary shaded by a mass of purple Bougain-villia.

Every pond and marsh near Cairo is dotted with ducks, but one can rarely get near enough to identify them before they are up and away when still far out of gun-shot. They circle around and around and finally set out toward the city itself. If we go to the Zoological Gardens we shall discover their haven of refuge. On a lake only a few acres in extent are literally thousands of ducks. The majority are shovellers, paired and in full plumage, with a lesser number of green-winged teal and a few score of pintails. They sleep or preen their plumage or come for a bit of bread almost within arm's reach, but as twilight falls they will betake themselves to the marshes outside, changing in character from the tamest of ducks to the wildest of water-fowl.

So dry is the climate that the small bird cages are cleaned only about once a year, a few daily scrapes with a stick through the wire removing completely all vestiges of food or other debris.



SHOE-BILL STORK. Ghizeh Gardens, Egypt,

The most interesting species of bird is the shoe-bill, (Balaeniceps rex), three individuals of which stalk solemnly about near the house of Captain Flower. When approached they clatter their bills like a stork, bringing them gradually forward and downward until they touch the ground. In spite of all accounts in books of natural history, the shoe-bills refuse to touch shell-fish, and in fact all fish except a certain species of mullet. In the same paddock are two magnificent saddle-billed storks, reared from the nest. The eyes, small side wattles and frontal plates are brilliant yellow, while the basal and terminal parts of the mandibles are intensely scarlet, and the remainder black.

Among the mammals, two from Madagascar were the prizes,—the tenree, a long-snouted nondescript in appearance, and the fossa. (Cryptoprocta ferox). This brought to mind a yaguarundi in general appearance, but when it leaped up and clung to a branch the resemblance ceased. In its facial expression and the car-

riage of its tail, it was decidedly lemurine. The Director told me that its method of progression varied from plantigrade to digitigrade.

The young white-tailed gnus, bred in the Garden, are remarkable in appearance, in that their horns are straight spikes, pointing upward. The curved portion does not appear until after the first year or two.

Many young mammals, and birds either building nests or sitting on their eggs, bore witness to the excellent conditions of captivity, while there were many wild birds breeding at this time in the trees and shrubs along the walks.

To an American visitor, not only are the exhibits interesting, but the Arab attendants, the veiled native women visitors, the mosques of the city beyond, all hold one's attention. And when the Director, escorting one out to the main entrance, points to the reeds of the Nile shore, a hundred yards away, as the reputed spot of the discovery of the infant "Moses," one feels that this Zoological Garden is indeed one of varied and unique interest!

A mile or two away is the aquarium, containing seventeen tanks, placed in an artistic artificial grotto of cement. A huge electric catfish from the Nile wins our respect when

we learn that he would be capable of giving a fatal shock to a man. This aquarium has recently been put under the direction of Captain Flower.

One other institution worthy of mention in Cairo is the Museum of Geology, again with a collection representative only of African, indeed of Egyptian, minerals, metals and fossils. The credit of arrangement and labelling is due to Dr. Hume.

At the Museum of Zoology the Anderson collection of Reptilia and Amphibia and the Boulanger collection of fishes are very fine, but the lighting is so poor and the general labelling and arrangement so inadequate, that the casual visitor can gain little by visiting them. The visiting ornithologist can profit much by looking over Mr. Nicoll's excellent collection of skins made at Ghizeh.

I have intentionally omitted mention of the great Museum of Antiquities, as my object in



SADDLE-BILLED STORK. Ghizeh Gardens, Egypt.

this brief article is only to point out the lesser known zoological points of interest in Egypt. C. W. B.

BOSTON'S ZOOLOGICAL PARK,

A FTER several years spent in the consideration of ways and means, the proposition of the Massachusetts Zoological Society for a Boston Zoological Park is now about to materialize. The original proposition of the Society was that the new institution should be located in the Middlesex Fells Reservation; but it was found that sufficient funds could not be obtained with which to develop a great vivarium in that particular locality, which happens to be outside of the corporate limits of the City of Boston. The financial aid that was hoped for, and expected from the state legislature, was finally refused.

It was then that the Mayor of Boston proposed that the Zoological Park should be located

in a portion of Franklin Park, which would enable the City to utilize funds from the Parkman bequest, with which to pay for the necessary improvements. Inasmuch as this appeared to be the only alternative, the Mayor's proposition was finally accepted by the Zoological Society, and it is understood that forty acres of Franklin Park will be devoted to the new institution.

It is a satisfaction to be able to state that throughout the entire course of the movement for a Boston Zoological Park, the Metropolitan Park Commission has steadfastly and earnestly favored it and has done its utmost to further the plan. The Commission offered to the Zoological Society a site in any one of the metropolitan parks, and long ago promised financial aid to the limits of its powers. On some accounts, it is rather unfortunate that the legislature did not choose to support the undertaking. The locating of the new institution in Franklin Park necessarily means a restricted area of land; but perhaps this will be compensated by superior accessibility.

It goes without saying that all zoologists, and especially those who are interested in zoological gardens and parks, will rejoice in the fact that the plans of Boston are now about to materialize. That the new institution will universally be called by its right name is too much to hope for; for in all probability it will be "zooed" from the beginning to the end of its chapter. We recall that in one article published in the Boston newspapers regarding the proposal of the Massachusetts Zoological Society, the thing desired was referred to sixteen times as a "zoo," and never once was it called by its right name. We respectfully call the attention of all Boston editors to the fact that a sufficiently persistent misnaming of a zoological park can, in a measure, belittle the best vivarium in the world, and outside of its own immediate sphere of influence persistent "zooing" can attach to it an idea of cheapness that is far from beneficial. Let it be



YOUNG TURKEY VULTURES.

Bred in Morris County, New Jersey.

known in Boston and elsewhere that a zoological park, or zoological garden, is a public institution of large size and more or less dignity; but a "zoo" is a small, cheap and usually smelly affair, with little scientific standing, or none at all, and is the identical kind of an affair that the good people of Boston assuredly do not wish to see developed in their midst. W. T. H.

BREEDING OF TURKEY VULTURES, MORRIS COUNTY, NEW JERSEY.

THE gradual but steady intrusion of a number of species of austral birds into the avifauna of more northern districts, is a phenomenon that is greatly interesting American ornithologists at the present time. The cardinal and the mockingbird are no longer rare stragglers in the vicinity of New York; the Carolina wren and the tufted titmouse have been recorded in the note-book of many an enthusiastic observer. Previous to 1909, there were but two records of the occurrence of the Florida gallinule at Ithaca, N. Y., but in that year no less than three pairs of these birds nested near the lake.*

Since so many of the smaller birds appear to be extending their summer habitats, it is not remarkable that some of the larger forms should do likewise. Because of its large size and conspicuous sailing, the turkey vulture could not long escape notice, and it must now be added to the list of summer visitors near New York.

The mention of the turkey vulture always brings to mind a warm, sunny climate. The birds have for years very rarely come north of southern New Jersey. During the past few years, however, turkey vultures have increased in the northern portion of that state. At Morristown and Bernardsville, they were very common in the summer of 1909. Perhaps the most interesting fact concerning the northern extension of the range of this species, is the recording of the breeding of the turkey vulture in Morris County, New Jersey, at a point midway between Boonton and Butler, on the estate of Mr. Morris Kinney, who has kindly furnished the following data:

The nest was discovered about June first, an old fox den, high up on a rocky cliff, having been pressed into service. The nest proper was at the end of a rather lengthy passage and little could be seen of it. It was found, however, to contain two young birds, very recently hatched. They were covered with pure white

^{*}Wright and Allen, The Auk, Vol. XXVIII, No. I, p. 65.



MALLARD DUCKS NESTING TOGETHER.

down, with the exception of the heads, which were bare and reddish in color. The photograph was taken by Mr. Kinney on June 25,

when the birds were probably about five weeks old. Unfortunately, no record was kept of the date at which the youngsters took flight, but this event finally took place, late in the summer.

It will be most interesting to note if the birds return to their nesting-place in 1910, and it is to be hoped that a more accurate account will be kept of

the important points in the life-histories of the young.

L. S. C.

mallard, and not least strongly in the selection of nesting sites.

The flock of mallards in the Zoological Park, starting from a very unpretentious few, now numbers several hundreds, the majority of which are un-pinioned and hence have the liberty of the Park, even exceeding its limits, sometimes disastrously, for the ubiquitous small boy is ever ready with the proverbial "rock" for the straying bird. The nesting sites within the confines of the Wild Fowl Pond are necessarily limited and are usually claimed early in the year by the pinioned females, that cannot "gad" about as freely as their full-winged sisters. Most of the latter, therefore, must seek temporary homes elsewhere, and some of their selections are well worth notice. A better example of protective coloration than a female mallard would be difficult to find. The dark brown mottled feathers seem to blend admirably

> into every color scheme of nature. One bird made her nest on a narrow bit of sod which has grown in a crack in the face of a large rock west of the Wild Fowl Pond. The crack is horizontal and about one foot from the ground, protected only by a stray branch or two; yet only the sharpest eye can detect the sitter. Another has wedged her-

other has wedged herself between the roots of a giant elm. There is absolutely no cover, yet it is almost impossible to make out the patient mother. When intruders are near, a leaf blown



NEST OF A MALLARD IN THE MULE-DEER SHELTER.

NESTING OF THE MALLARD.

THAT the great readiness which the mallard evinces for putting on the empty cloak of civilization was appreciated and taken advantage of by our very remote ancestors, is evidenced by the innumerable multitudes of the effete descendants of these splendid birds, ranging from the lowly "puddle-duck" of the country roadside to the great Rouen, which has retained the original color of plumage. To thus endure the vicissitudes of captivity, a wild creature must possess adaptability in an extreme degree. This is admirably developed in the



MALLARD'S NEST IN ALASKAN INDIAN HOUSE.



NEST OF A MALLARD IN THE ELEPHANT YARD.

against the bird's face will not cause her to move in the slightest degree. Even her eyes refuse to blink. An extended hand may almost touch her back, but an instant before the actual contact she will rush from her nest with loud cries of protest, and will not return until some time after the departure of the disturber. Both of the tiny houses in the enclosures of the coypu rats have been pressed into service as temporary nurseries by the ducks. Each is presided over by a demure mallard, and neither eggs nor young are ever disturbed by the rightful owners of the shelters. One of the houses, measuring perhaps eight by twelve feet, used for shelters for the mule deer, has a duck nest in each of two corners. The deer sleep here nightly and seek protection during storms, yet seem to exercise great care to avoid disturbing their guests. But perhaps the most eccentric nest of all is one placed in the yard of "Luna" the great Indian elephant, close up against a wall, behind a refuse box. "Luna" seems very proud of her little friend, and appears to have no desire to disturb her.

Another queer habit, which is doubtless a result of semi-domestication, is communal nesting, generally participated in by two ducks. These birds will either lay all their eggs in one nest, each incubating half, or they may build two nests, so close together that when both birds are sitting, it is quite difficult to say just how many there are on the nests. This joining of interests is a very strange peculiarity, and difficult of explanation, for it seems to serve no particular purpose.

L. S. C.

A WHITE RHINOCEROS HEAD.

HREE weeks ago, President Roosevelt advised the Zoological Society that he proposed to present to the National Collection of Heads and Horns the head of one of the white rhinoceroses that fell to his rifle in the Lado District. Naturally the news of this accession was hailed with the keenest satisfaction, partly because of the extreme rarity of the specimen, and partly because Colonel Roosevelt is to be represented in the National Collection by a specimen that is worthy to stand as a gift from the foremost sportsman of the world. At this moment there is not in all America a single mounted skin. nor even a mounted head, of a white rhinoceros: and we know of only one skull. In a short time. however, it is probable that more than one American museum will be enriched by the gift of a complete mountable skin of a full-grown specimen of that species.

To all zoologists and sportsmen who have not closely followed the explorations of Major Powell-Cotton in the Lado District, the development of a new territory containing white rhinoceroses has been overlooked. We must confess to profound surprise from the news that west of the Nile and Lake Albert there is a large area that evidently is well stocked with the "square-mouthed" rhinoceros, which, until recently, was regarded as being on the point of extinction. The narrative of Colonel Roosevelt's hunting explorations in that territory should be awaited by the public with very keen interest. Meanwhile, we find profound satisfaction in the fact that the National Collection of Heads and Horns is so soon to be enriched by another profoundly interesting, and also imposing, zoological rarity. W. T. H.

A GREAT ELEPHANT HEAD.

THROUGH the kindness of Mr. Samuel Thorne,—for eleven years a member of the Board of Managers of the Zoological Park, and a member of the Executive Committee,—the National Collection of Heads and Horns has received, as a loan, the magnificent elephant head shot in British East Africa in 1906 by Mr. Richard Tjader, and mounted in the following year by Mr. Herbert Lang, at the American Museum of Natural History. The acquisition of this grand trophy, even as a loan, may well be regarded as a notable event in the history of the Heads and Horns Collection; and it is a



AFRICAN ELEPHANT HEAD. Loaned by Samuel Thorne, Esq.

double satisfaction that it will be found duly installed when the Collection is first shown to the members of the Zoological Society, and to American sportsmen generally. It will play an important part in hastening the day when a special building will be provided for the heads and horns, in order that the millions of visitors to the Park may have free access to a collection that certainly has provoked much curiosity.

The Tjader elephant head is assuredly one of the most perfectly and beautifully mounted elephant heads that we have ever seen. It is to be borne in mind that the taxidermist, Mr. Lang, saw the animal shot, and it was he who photographed it, measured it, skinned it, and preserved the skin in the field. The anatomy of the head has been reproduced with marvelous fidelity, and the specimen is even more true to life than if the head had been cut off the animal and hung in the flesh upon the wall. The peculiar reddish-brown color of the skin is evidently due to the color of the ground on which the animal lived. Because of the industry and persistence with which elephants cover themselves with dust, to keep off insects, every elephant is bound to partake of the color of the dust of its environment. The animal measured ten feet, four inches, at the shoulders. The tusks are six feet, nine inches in length, and weigh 160 pounds. It rarely happens that a mounted elephant is permitted to possess, in a museum, such fine tusks as these. Very often the tusks are reproduced in plaster, or papier-W. T. H. mache.

ZOOLOGICAL SOCIETY BULLETIN

Number 40

Published by the New York Zoological Society

July, 1910

NATIONAL COLLECTION OF HEADS AND HORNS.

WHEN Mr. Madison Grant declared in his address on June 2, that "as big-game sportsmen, we are the last of our race," the statement startled his audience; but the sentences that followed quickly convinced every listener of its truth. The occasion was the luncheon given by the Zoological Society at the Boat House Restaurant in the Zoological Park, for the contributors to the National Collection of Heads and Horns.*

*Mr. Grant's address will be published in full in the next number of the "Heads and Horns" annual. The key-notes of Mr. Grant's address were—the inexorable disappearance of the grand game animals of the world, and the imperative necessity of gathering now the collections that will adequately represent them hereafter when remnants of the wild species of to-day will exist only in protected game preserves,—or not at all.

As an illustration of what the immediate future has in store, take the wild-animal paradise that still exists in British East Africa. There are few men who know more of the wild life of that region, by actual daily contact, than Mr.



AFRICAN ELEPHANT TUSKS, PRESENTED BY THE LATE CHARLES T. BARNEY. Some of the heads and horns from the Barber Collection may be seen on the wall.



NORTHEAST CORNER OF THE ZOOLOGICAL SERIES.
Portions of the Barber, Madeira and House Collections are shown.

Arthur Jordan, of Nairobi and the veldt. We asked him recently, "How long will the game of British East Africa last in anything like abundance, as it is now being shot, and as the country is being settled up?"

He replied, "Oh, it will last quite a long time.

At least ten years! But outside of the preserves, it is bound to go."

Another authority, when asked the same question, thoughtfully answered, "Outside the preserves, the best of the big game will be gone in ten or fifteen years."

It is indeed time for the men of to-day who care for the interests of the men of to-morrow, to be up and doing in the forming of collections that a hundred years hence will justly and adequately represent the vanished wild life of the world.

It is impossible to give in this short article anything more than a brief sketch of the National Collection of Heads and Horns as it appeared at the private view afforded the sportsmen of America, and the contributors, on June 2, 1910. Owing to the unfortunate delay that it seems must yet ensue in the furnishing of the Administration Building, by contract made at a public letting, the building is fated to remain closed and unused until—Heaven alone knows when!

As the collection hangs to-day, it is to be regarded only as a serious beginning. In some features it is already strong, in others it is confessedly weak. Already it crowds the walls of the two picture galleries that we once thought would hold it rather handsomely for about five years. Already we are compelled to apologize because the specimens of the Barber Collection, the Donaldson-Smith Collection, and others also, are so crowded that even the "record" horns are cramped for room.

The promptness and enthusiasm with which the sportsmen and nature-lovers of America—and England also—have come forward in support of the plan inaugurated only three short years ago, have surprised and delighted the Zoological Society. At first there was some fear that the effort might not receive much support outside of New York City; but that apprehension quickly proved to be groundless. We have received valuable gifts from British East Africa, Kashmir, London, Philadelphia, Pittsburgh, Doylestown, Victoria, Santa Barbara and Chung King, China.

In heads and horns of African big game, we begin to be strong. Beginning with the largest forms, the magnificent African Elephant head loaned by Mr. Samuel Thorne, and the great "record" tusks presented by Mr. Charles T.



GEOGRAPHIC SERIES LOOKING TOWARD THE EAST.

Part of the Reed-McMillin Collection, and the Elephant Head loaned by Samuel Thorne are shown.

Barney, will not soon be surpassed. The F. H. Barber South African Collection, presented by Messrs, Frederick A. Schermerhorn, Lispenard Stewart, Frederick G. Bourne, Charles F. Dieterich and William D. Sloane, contains not only a great number of species, rare and common, but also many records. Such collections as this are brought together only through years of patient and industrious effort, and many sacrifices; and we say again that when Mr. Grant secured the subscriptions that purchased this important series, he scored another grand coup for New York. The most important specimens of the Barber Collection are the following records: Cape Buffalo, Greater Kudu, Waterbuck, Lechee Antelope, White-Tailed Gnu, Wart-Hog, Springbuck and Steinbuck,

The gift of Edward J. House is at once rendered noteworthy by its magnificent Reticulated Giraffe head, with a full-length neck. Mr. Percy Madeira's gift is made conspicuous by its Hippopotamus head. Mr. George L. Harrison's beautiful group of antelopes and gazelles contains the rare Addra Gazelle, White-Eared Kob and the Thomas Uganda Kob.

The Donaldson-Smith Collection, presented by Mr. George J. Gould, through Mr. Grant, contains four large heads of special value and interest, of Abyssinian Buffalo, Gaur, Indian Buffalo and Reticulated Giraffe. The collection given by Newland, Tarlton and Company, of Nairobi, is particularly strong in specimens of Jackson Hartebeest, of which there is a large series. Mr. J. W. Norton's Eland, Waterbucks and Pallahs make a very satisfactory feature of the African continental exhibit.

With the matchless Reed-McMillin Collection from Alaska, New York is now fairly familiar. It was the first—and the largest—individual gift, and fortunately was in such shape that it was immediately presentable to the public, pictorially. It is very rich in Giant Moose from the Kenai Peninsula, Grant Caribou and Alaskan Brown Bear. At first the two largest and finest bear skins were hung upon the wall; but a little later it was found that the great space they occupied was so imperatively demanded by the heads and horns of the continent of North America that it was necessary to take them down.

In planning the arrangement as a whole, it was decided that so long as the collection remains in the Administration Building, several of the individual-gift collections will be kept to-

gether, even in the zoological series. This idea has been carried into effect, and because of this, the systematic arrangement of about one-third of the zoological series is imperfect. The groups representing the Deer Family, the Wild Cattle, the Sheep, and the Goats, Ibexes and Rupicaprines, are fairly satisfactory, and they at least serve to indicate what will be possible when we secure a building of ample size, specially designed to accommodate the National Collection for the next hundred years.

In the Geographic Series, the Asiatic exhibit is weak, chiefly because of the fact that what would have been its strength has been bestowed in the Zoological Series. From Asia we need all the Markhors, nearly all the Sheep, and many Deer. And this reminds us of a very pleasing episode.

At the very moment when the Contributors' Fund became exhausted by important purchases, Mr. H. Casimir de Rham subscribed to that fund \$2,500! Forthwith, portions of it were used in acquiring the monster eighty-nine inch horns of an Indian Buffalo-now in the Asiatic section-the head of an Astor Markhor for the Zoological Series and two fine sheep heads-Ovis karelini and O. nigrimontana-that were collected only last year in Eastern Turkestan by Mr. Douglas Carruthers. The last-named species had not before existed in the collection; and we doubt whether there are more than four or five specimens in all the museums of the world. In Mr. Rowland Ward's fifth edition of his Records of Big Game, the species is not mentioned. It is like a small edition of O. karelini, which in turn is like a small edition of Ovis poli.

The Contributors' Fund, to the making of which thirty-six sportsmen subscribed, has been of very great service in the founding of this collection. By means of it thirty-four specimens representing thirty-one species of particular scientific value and rarity, have been purchased; and through it a number of gaps have been filled.

In the Zoological Series, we can contemplate our Deer Family with considerable satisfaction; for it is much more than a beginning; and the same is true of the Wild Cattle, Sheep, and the Goats and their allies. All these are so far along that the zoological gaps in them are not very conspicuous. As Captain John S. Barnes trenchantly remarked after viewing the Zoological Series, "It will now take a smart man to tell what this collection lacks!"



A CORNER OF THE ZOOLOGICAL SERIES. Showing some of the Wild Cattle and Sheep.

The collection representing the Deer Family begins to be strong, especially in Moose and Caribou. Of the former, we have heads and horns from the Kenai Peninsula, the Atlin District, Wyoming, Canada, New Brunswick, Europe and Siberia. Of the Caribou and Reindeer the following species are present:

European Reindeer, Greenland Caribou, Peary Caribou, Barren-Ground Caribou, Newfoundland Caribou; Woodland Caribou, Black-Faced or Mountain Caribou, Osborn Caribou, Kenni Caribou and Grant Caribou.

We must confess to a weakness where strength might fairly be expected. We have only begun to represent the American Bison of the plains; and as yet we have not even one head of a bull. This is because a thoroughly satisfactory head is not easy to find, nor easy to procure when found. A mediocre head will not serve.

We are also weak in specimens of the American Elk, our only representative being a head from Wyoming, with antlers extremely massive but not long, presented by Mr. Thomas D. Leonard. We need two or three heads with

antlers of great length,—at least exceeding fifty-eight inches. Of the White-Tailed Deer, we have only one surpassing head, the gift of Mr. George Bird Grinnell. Of the Mule Deer we have three splendid specimens: the first-record antlers from Mr. Frank Hart, the magnificent freak head from the Lawyers' Club of New York, and the enormous head from Kalispell given last fall by Mr. Henry Disston, Jr.

The total number of specimens in the National Collection to-day is 665; but we have not yet had time to finish our catalogue in good form, and count the species. Up to date, sixty-eight persons have contributed specimens and thirty-six have subscribed funds for purchases. The money value of the collection is not less than \$50,000, but its zoological and educational value is not to be computed in commercial terms.

Of world-record horns and tusks the collection contains to-day sixteen firsts, ten seconds, three thirds and two fourths.

As the collection hangs in the upper rooms of the Administration Building, it is utterly im-

possible to make it accessible to the millions of people who visit the Zoological Park. It is possible only to show it to the specially interested few who can properly be permitted to penetrate to the farthest corners of an office building. But the present home of the collection is only temporary. Already the Zoological Society has been unofficially invited to submit an estimate for a special building, to stand between the Primate House and the Administration Building. The public is anxious to see the collection, and the Society desires that every portion of it shall be made accessible to the millions who are interested in wild-animal life. We hope that a suitable building will be provided by the City, in the future. W. T. H.



MALLARD DUCKS

Zoological Park Calendar.

MAY 1-JUNE 20, 1910.

Births.—Five American Bison, six European Red Deer, one Barasingha Deer, one Sika Deer, one Equine Deer, one Axis Deer, twin Mule Deer, three American Wapiti, one Altai Wapiti, two Fallow Deer, one Rocky Mountain Goat, two Himalayan Tahr, four Ring-Tailed Lemurs, two Peccaries, one Bactrian Camel.

Young birds.—Three hundred Mallard Ducks, seventeen Canada Geese, five Cereopsis Geese, seven White Call Ducks, five Formosan Pheasants, five Canaries.

* * *

Accessions.—Two Elands, three Black Apes, one Red-Headed Mangabey, two Sooty Mangabeys, one Green Monkey, two Lion Marmosets, four Slow Lemurs, one Spotted Lemur, one Mouse Lemur, one Morbled Cat, one Black-

Backed Jackal, one African Skunk, four Sea Lions, one Brazilian Porcupine, one Brush-Tailed Porcupine, one Prehensile-Tailed Porcupine, six Asiatic Squirrels, six Jerboas, two Common Opossums.

Mitred Guinea Fowl, Red-Billed Toucan, European Curlew, Temminck Tragopan, American Oyster-Catcher, Rüppell Spur-Wing Goose, Adelaide Parrakeet, Red-Rump Parrakeet, Brazilian Teal, Olive-Sided Flycatcher, White-Necked Crane, Manchurian Crane, Rosy-Headed Parrakeet, Ruddy Turnstone, Marbled Quail, Pileated Tinamou, Viellot Fireback Pheasant, Bornean Fireback Pheasant, Pennant Parrakeet, Blue Mountain Lory, Crimson-Winged Finch, Striated Coly, Gray-Winged Ousel, Yellow-Vented Blue-Bonnet Parrakeet, Yellowish Slender-Billed Weaver.

* * +

Sales.—The following specimens from the surplus stock bred and reared in the Zoological Park, have been sold to various zoological gardens and menageries:—

Seven Japanese Sika Deer, one American Wapiti, one White-Tailed Deer, two Sambar Deer, two Axis Deer, two Hog Deer, one European Red Deer, two Fallow Deer, one American Bison, one Bactrian Camel, two Himalayan Tahr, two Hybrid Bears, three Occlots, three Opossums, two Deer Mice, twelve Painted Turtles, two Gila Monsters.

Heads and Horns.—The National Collection of Heads and Horns now hanging in the new Administration Building was shown at a private view to the members of the Society on May 16 and a gathering of sportsmen from various places on June 2. An article in this issue is illustrated with several views of the collection.

* * +

A New White Goat.—The second addition to the little herd of white goats occurred on June 8, when the remaining female from the original herd gave birth to a fine young male. The kid is a lusty specimen and promises to equal the first one, "Philip," which is nearly matured. The mother is one of the herd of five that came to the Park in 1905. The collection now numbers six animals, but two losses having occurred,—the mother of "Philip" and a young female that was received on deposit, May, 1909. The

goats have attained maturity, and apparently are thoroughly acclimated and healthy. An account of the capture of the goats is printed on page 680 of this issue.

* * *

A Municipal. "Zoo."-The City of Rochester has for several years maintained a municipal "zoo" with such marked success that they have established a new one in the Durand-Eastman Park,-a tract of land embracing 500 acres, donated by a Mr. Durand and George Eastman of Kodak fame. The site selected is admirably adapted to the maintenance of a varied collection. Two large, swampy areas will be converted into artificial lakes for water-fowl and aquatic animals. A den for bears has already been constructed and three American black bears are on exhibition. By far the greater part of the collection is composed of hoofed animals, all of which have been purchased by C. C. Laney, Supt. of Parks, Rochester, from the Zoological Park.

Buffalo Jones' Lioness .- "Buffalo" Jones has deposited with the Society the two-year-old East African lioness which he captured near Kijaba, British East Africa, and the animal was safely quartered at the Lion House in the Park, June 15. To effect her capture, the lioness was trailed with dogs and lassoed when she came to bay. Some difficulty was encountered in accomplishing this feat, as the lioness displayed great bravery in fighting the dogs and men. She took refuge in a fissure in the ground from which place she was finally dislodged by a cannon fire cracker. As she bounded out of the shelter, two ropes were cast over her from opposite sides. A third rope over the bough of a tree raised her from the ground and a pair of tongs, specially constructed for the purpose, was then clamped upon her nose. In this helpless state she was speedily transferred to a sledge and dragged to camp. She has an abundance of her fighting spirit, which a long, tedious voyage seems not to have dampened.

MOULTING OF THE PTARMIGAN.

FOR many reasons, the ptarmigan is the most interesting of American game birds. It is associated in mind and fact with bleak mountains and drifting snow, while its tameness is almost proverbial. In the early days of the gold fever many a famishing prospector blessed

the trusting ptarmigan which he found such easy prey to a bit of ice or even a stick. Now, however, the birds have learned the error of their ways, and are far less abundant near the habitations of mankind.

In spite of its confiding manner, this grouse does not take kindly to captivity; in fact, it is very difficult to keep alive for any length of time, particularly through the summer months. In the fall of 1909, however, there arrived at the Zoological Park, three unusually fine specimens of the Willow Ptarmigan, (Lagopus lagopus), that are now in faultless condition, as the result of great assiduity on the part of their keepers. These birds were practically pure white at the time of their arrival at the Park.

It is well known that ptarmigan are extremely aberrant in their moulting processes. There are certainly three plumages: white in winter, chestnut brown more or less barred with black in summer, and black barred with light brown in the fall. Those individuals which range farthest north never come nearer summer plumage than the growth of a few brown feathers in the upper parts; the most southerly are always pure white on the breast and abdomen. when in summer dress. There are of course all sorts of variations in intermediate birds, depending on the temperature of their habitats. The actual process of feather change is very much prolonged; the old feathers dropping singly, long intervals often intervening, so that the entire moult may be prolonged several

The finest bird in the present lot, a very vigorous male, commenced dropping a few feathers from the region of the head and neck about March 1, 1910. These were slowly replaced by others of a rich chestnut hue. This process was steadily continued, but it was nearly May 1 when the change of plunage seemed to have progressed as far as it would in this individual.

Far more interesting, however, is the case of the remaining two birds, a male and a female. In these specimens, the first feathers were not dropped until about May 15. But instead of the rich chestnut of summer, these feathers are being gradually replaced by the brown-barred black ones of the fall plumage! The summer coat has been entirely omitted. This instance is simply another illustration of the disregard of the ptarmigan for the seasons, excepting in the most general way.

L. S. C.

ZOOLOGICAL SOCIETY BULLETIN.

ELWIN R. SANBORN, EDITOR

Benartmenta:

MANINAT. W. T. HORNADAY, Sc. D. AGHARIUM C. H. TOWNSEND, Sc. D.

BIRD C. WILLIAM BEEBE. REPTILE RAYMOND L. DITMARS.

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JULY, 1910

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SPECIAL ACTS OF THE LEGISLATURE CONCERNING THE SOCIETY.

An Act to amend chapter four hundred and thirty-five of the laws of eighteen hundred and ninety-five, entitled "An act to incorporate the New York Zoological Society and to provide for the establishment of a zoological garden in the city of New York," in relation to real and personal property. Accepted by the city. Became a law May 6, 1910, with the approval of the Governor. Passed, threefifths being present.

The People of the State of New York, represented in Senate and Assembly, do enact as follows:

Section 1. Section six of chapter four hundred and thirty-five of the laws of eighteen hundred and ninety-five, entitled "An act to incorporate the New York Zoological Society and to provide for the establishment of a zoological garden in the city of New York," is hereby amended to read as follows:

§ 6. Said corporation may take, purchase and hold real and personal estate necessary for the purpose of its incorporation, and shall possess the general powers and be subject to the restrictions and liabilities prescribed in article two of chapter twenty-three of the consolidated laws, entitled "general corporation law," being chapter twenty-eight of the laws of nineteen hundred and nine.

§ 2. This act shall take effect immediately.

An Act to amend chapter four hundred and forty-one of the laws of nineteen hundred and two, entitled "An act to authorize a further appropriation to the New York Zoological Society for the support of the New York Aquarium," in relation to the amount of the appropriation. Accepted by the city. Became a law May 6, 1910, with the approval of the Governor. Passed, three-fifths being present.

The People of the State of New York, represented in Senate and Assembly, do enact as follows:

Section 1. Chapter four hundred and fortyone of the laws of nineteen hundred and two. entitled "An act to authorize a further appropriation to the New York Zoological Society for the support of the New York Aquarium," is hereby amended to read as follows:

§ 1. The board of estimate and apportionment of the city of New York may annually, in its discretion, include in the budget for the then next ensuing financial year, in addition to any sum or sums which may be appropriated for the adequate support and maintenance of the New York Zoological park or gardens, situated in the

borough of the Bronx, and administered and controlled by the New York Zoological Society, a further sum or sums, in its discretion, for the use of the said New York Zoological Society, provided, however, that the additional appropriation hereby authorized shall be made only in case an agreement is entered into between the said New York Zoological Society and the city of New York, acting by its board of estimate and apportionment for the adequate keeping. maintenance, extension, preservation and exhibition of the building and approaches thereto and collections of aquatic animals and plants contained therein, known as the New York Aguarium, situated in the Battery park in the borough of Manhattan in said city, and also for furnishing opportunities for study, research and publication in connection with said collections. which contract the said board of estimate and apportionment is hereby expressly authorized, in its discretion, to make upon such terms and conditions as may be agreed upon with the said New York Zoological Society, and which contract shall also provide how the duty of the commissioner of parks for the boroughs of Manhattan and Richmond in respect to maintaining the said aquarium now imposed upon him by law shall be performed.

§ 2. This act shall take effect immediately.

THE NATIONAL BISON HERDS.

Very satisfactory reports have been received from the wardens in charge of the Montana National Bison Herd, and the Wichita Herd. Concerning the former, Warden Andrew F. Hodges reports that the herd came through the winter in very fine condition, and that up to May 20, several calves had been born.

From Warden Frank Rush, in charge of the Wichita National Herd, we have received the following report:-

"The five calves which were due to arrive in the Wichita Buffalo herd are all here, 3 bulls and 2 heifers. This brings our total number to 23 head, 10 males and 13 females, all in the very best condition. I wish you could see them. They certainly look very prosperous, and if you were here you could see in reality what you had

predicted for the Wichita Bison herd many years ago."

The last remark of Warden Rush refers to immunity from Texas fever.

MEMBERS NEWLY ELECTED.

May 1-June 15, 1910.

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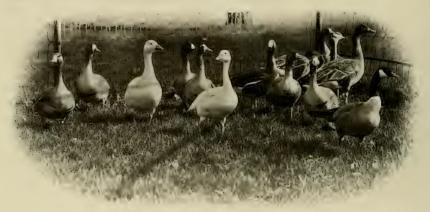
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All those interested in the work of the Society in the Zoological Park, or Aquarium, are cordially invited to become members. Information concerning membership may be obtained at the office of the Society, 11 Wall Street, at the Zoological Park or the Aquarium.



AMERICAN WATER FOWL IN THE ZOOLOGICAL PARK:

AN AMERICAN COLLECTION OF GEESE.

By LEE S. CRANDALL.

THE confinement of wild birds has been practiced throughout the ages by people of many classes, in the pursuit of both pleasure or material gain. While the gallinaceous birds have doubtless been accorded premier honors, the water fowl have always been deservedly popular, as witnessed by their universal culture. In this country one of the most enthusiastic collectors is Mr. T. A. Havemeyer, who has gathered together on his estate at Mahwah, New Jersey, an imposing collection of about 300 specimens, including seven species of swans, twenty-eight of geese and eight species of ducks.

The grounds include about 3,200 acres of broad, rolling lowlands, beautifully situated between heavily wooded mountains, and their attractiveness is greatly enhanced by the herds of European red deer and the numerous English ring-neck pheasants that have been acclimatized.

The water fowl are divided among three enclosures, all of which include miniature lakes and an ample expanse of grazing ground.

The first paddock encountered includes half an acre of pasture and a pond of double this area. In it are kept a pair of Hawaiian Geese, (Nesochen sandvicensis), three Little White-Fronted Geese, (Anser erythropus), two pairs of Magellan upland geese, one pair of cereopsis, four spur-wing, two semi-palmated, three young European white-fronted geese and four blacknecked swans.

Two of these species are of sufficient interest to deserve detailed comment.

The Hawaiian geese are the rarest and most beautiful of the birds in this enclosure, and perhaps they are the first of their kind to be seen in this country. Their general color is brown, each feather bordered with white; the head and face and a band around the neck are black, with the throat creamy-brown. The bird weighs about three pounds. Like other Hawaiian birds, this goose may soon become extinct as the result of indiscriminate slaughter by Japanese immigrants. It is found almost solely in Kona, a district of Hawaii, where it breeds on the old lava fields, feeding on grass and berries, notably those of a very abundant Vaccinium, and rarely going near water. For some reason, this goose never breeds on any of the adjacent islands, several of which are in sight.

A very interesting fact, confirmed in living birds in the Gardens of the Zoological Society in London, is the giving off of a musky odor from the neck of this goose. In Europe, the Hawaiian goose has proved quite hardy, and has even been induced to breed. It is very docile by nature and affectionate toward man.

The little white-fronted geese are handsome birds, and far from common in captivity. They are easily distinguished from the young specimens of the European white-fronted goose in the same paddock, by their smaller size, larger frontal patch and pink beaks. These two species of geese were confused for many years, and it is only recently that their specific identity has been admitted.

The little white-fronted goose breeds in Lapland, and the northern coast of Siberia, migrating in large numbers in the fall to Europe and Asia, going as far south as Greece and Turkey and even into Northern Egypt. In these regions a great deal of damage is often done to the winter crops; young corn and wheat being destroyed in great quantities.

The second paddock is the smallest of all, and includes perhaps one-half acre, with a small pond. In this are kept the wonderful Little Maned Goose, (Chenonetta jubata), of Australia, two pairs of the Emperor Goose, (Philacte canagica), with a pair of black swans, a flock of the vicious Egyptian geese, and a number of ducks—wood, Mandarin, mallard (one of these is a perfect albino); red-head, pintail, European widgeon and blue and green-wing teal.

The maned geese are tiny creatures; no larger than widgeon. In Australia they are known as "wood ducks," and the females do, in a way, resemble those of our own handsome little birds. In general color, the males are dark above and light gray on the breast, where the feathers are mottled with black and grayish white; the lower abdomen is a glossy black, and the black wing speculum is bordered behind and in front with white. The female is duller and the breast feathers are more heavily mottled with white. The feathers of the back of the head and neck are somewhat lengthened, especially in the males, giving the bird a "maned" appearance.

This species ranges throughout the whole of Australia and Tasmania. The eggs, nine to twelve in number, and creamy white, are deposited in a hole in a tree standing near the water. It is said that the female brings the young to the ground in her bill.

The Emperor Goose is the rarest of the species found wild in America, and with its blue body, finely barred with white, and pure white head, makes a striking appearance. It inhabits northeastern Asia and northwestern America, and breeds near the mouth of the Yukon, and the north coast of Siberia, laying its eggs on the marshy shores. Late in the summer, when the birds have moulted their wing feathers and are unable to fly, thousands are taken in nets by the Eskimos. This doubtless accounts for the increasing rarity of the species.

The third paddock of Mr. Havemeyer's wild fowl enclosures is the largest and most important. In the center is a pond of about two acres; to the left stretches a splendid four-acre grazing ground, and to the right a two-acre marsh, heavily grown up with aquatic plants and marsh grass.

The collection of water fowl in this paddock presents a wonderful spectacle. One might find it difficult to believe that such a number of species could live together so amicably; yet the only friction that has ever occurred is that caused by the ever-quarrelsome Egyptian geese.

This gathering includes about 200 swans and geese representing the following twenty-eight species:—

Whooping swan, Bewick swan, whistling swan, trumpeter swan, mute swan, black swan, cereopsis goose, blue goose, lesser snow goose, greater snow goose, Ross goose, gray-lag goose, European white-fronted goose, American white-fronted goose, bean goose, pink-footed goose, bar-headed goose, Chinese goose, emperor goose, Canada goose, Hutchins goose, white-cheeked goose, cackling goose, barnacle goose, black brant, Magellan upland goose, Egyptian goose.

The collection of swans is complete and includes specimens of all of the known species—seven in number.*

The trumpeters are of course the most rare and interesting, as this species is thought to be nearly extinct in the wild state.

Hitherto the black-necked swan has rarely lived for long in this country, but Mr. Havemeyer's specimens are kept out all winter and are in perfect health.

Four of the species of the genus Branta are extremely interesting in their relations to each other, and here offer an unusual opportunity for comparison. The familiar Canada Goose, (B. canadensis), may be taken as the type. The White-Cheeked Goose, (B. c. occidentalis), is the western representative of the Canada, and is distinguished by its slightly darker color and a white ring around the neck. The Hutchins Goose, (B. c. hutchinsi), is a diminutive of the Canada, and hardly differs from it in color and comparative proportions. The Cackling Goose, (B. c. minima), bears the same relation to the white-cheeked as the Hutchins does to the Canada. The white neck-ring is very clean-cut. and the head and bill much smaller in proportion to its size, approaching in this respect the Barnacle Goose, (B. leucopsis).

^{*}For a detailed account of all the known species of swans, see "The Swans" by C. Wm. Beebe, Tenth Annual Report of the N. Y. Zoological Society, 1905.

The Blue Goose, (Chen caerulescens), is another great rarity. In color it resembles the emperor, but the blue body is not barred, the white is more extended and the beak shows the heavy mandibular groove of the genus Chen. For many years this goose was considered to be the young of the snow goose, and only recently has been accorded specific rank.

Where these geese breed has never been discovered, but they are said by the Eskimos to nest in the interior of Labrador. It is fortunate for the race that such an inaccessible site has been chosen, for it is less likely to share the fate of the emperor goose.

While this method of keeping geese makes a splendid display, it is not conducive to success in breeding, which, after all, is the most interesting feature of keeping wild birds in captivity. In the rearing of wild fowl, seclusion is the most important factor; without this, success can rarely be obtained. It is planned to build this year a number of smaller paddocks in which a pair of birds may nest in peace and it is hoped that many rare species will be raised. So far, the following have bred:—

Canada goose, Egyptian goose, Magellan upland goose, European widgeon and mallard duck.

The breeding of the upland goose is very interesting, and as far as known is the first record for this country.

One point which forcibly impresses the visitor, is the entire absence of the detailed care and feeding which might be expected in so large a gathering. Once a goose has been placed in a

paddock, it must be satisfied with the staple fare of grain which is provided for all the inmates, and the excellent condition of every bird testifies to the efficacy of this method.

In the early years of the collection, the rarer species were kept indoors during the winter, but last year every bird was kept in the paddock and not one was lost. If received in the fall, newly imported specimens which have been kept away from water for protracted periods, and whose plumage has become dry, cannot safely be wintered out. Those that have become accustomed to the place, endure the cold splendidly and are much healthier and stronger than birds kept indoors. It is quite surprising how many tropical birds withstand the rigors of our northern climate.

Since the writer's visit to Mr. Havemeyer's estate, importations have added to the collection two beautiful and uncommon species—the Ashy-Headed Upland Goose, (Chloephaga poliocephala), and the Ruddy-Headed, (C. rubidiceps). In the wild state, the latter is confined entirely to the Falkland Islands, while the gray-headed is found in Patagonia, going up to Chili and Argentina to escape the hardships of the Antarctic winters.

Both of these rare species have been bred in Europe, and all of Mr. Havemeyer's specimens were reared in captivity. This fact is of great advantage in the attempt to induce birds to breed, and it is hoped that Mr. Havemeyer will be able to establish more records for the first breeding of wild geese in captivity.



CANADA GEESE AND YOUNG HATCHED IN THE ZOOLOGICAL PARK.
This photograph is interesting as showing the swimming formation of the old birds—when alarmed—for
the protection of their young.



CEREOPSIS GEESE IN THE ZOOLOGICAL PARK.

BREEDING OF THE CEREOPSIS GOOSE. By Lee S. Crandall.

WHEN a bird or animal is known to be on the verge of extinction in the wild state, it is well to know that it will reproduce its kind successfully in captivity. It is particularly gratifying when this interesting event takes place in one's own country.

The Cereopsis or Cape Barren Goose, (Cereopsis novae-hollandiae), formerly was found in great numbers in the southern parts of Australia and among the neighboring islands. The early settlers were greatly pleased with the finely-flavored geese, which were so abundant and so

easily killed. It has ever been the custom among pioneers in a new land to take freely of the natural resources; the barren geese were slaughtered by thousands. To-day, the remants of the great flocks, wild as the winds. are confined to a few grassy, uninhabited islands. Their only protection lies in their stone-colored plumage; as they feed among the lichen-covered rocks, it is difficult to detect the birds before they take flight.

Like most of the geese this species has no close relative s—the cereopsis takes readily to captivity. It is one thing, however, to persuade a bird to live, and quite another to get it to breed. There have been a number of pairs of cereopsis geese in America; but as far as known, no successful attempt has been made at reproduction, in this country, prior to the series of events recorded in this article.

On August 6, 1909, the Society's first pair of these birds arrived at the Park, the gift of a bird lover. Placed in the spacious Wild Fowl Pond, they lived peacefully through the winter, avoiding the other inmates, never entering the water, and feeding on the grain provided only when snow covered the withered grass. Early in February, the devoted pair showed

marked propensities for wandering; they escaped from the paddock during the nights in all sorts of mysterious manners, and their clandestine wanderings were sure to land them in some remote corner of the Park. In an attempt to satisfy the apparent longings of the birds for new surroundings, they were removed to the Crane Paddock, where they settled down in obvious comfort.

Several sporadic attempts at nesting occurred but it was not until the middle of May that a small round depression in the ground was finally surrounded with twigs and leaves, built up and moulded into a beautiful nest. On May 23, the first white egg appeared, slightly smaller



CEREOPSIS GEESE IN THE ZOOLOGICAL PARK.

In both pictures the male bird is shown retreating last, leaving the young to the protection of the female while he stands guard.

than that of the Canada goose. It was immediately covered with soft down. Four other eggs were deposited beside the first, and incubation was commenced on the first day of April.

About this time the male developed the savageness which has since marked his conduct. He attacked the cranes that inhabited the paddock with such fury that these great birds had to be removed to save them from the vengeful beak! During the period of incubation every intruder was savagely attacked by the bird, who made amazing leaps in the air in the endeavor to reach his supposed adversaries.

On May 1, a tiny head was seen protruding from under the mother's wing, but it was not until the 3d that she left the nest, accompanied by five beautiful goslings, remarkably weak in comparison to young geese of other species. During the two days spent in the nest by the young birds, the female occasionally left to feed, covering the young with down as carefully as she would have covered her eggs. As the cereopsis gosling appears never to have been fully or correctly described, such data may be in order here.

The goslings are slightly smaller than those of the Canada goose. Above, they are yellowish-white, a brownish-black streak extending from the base of the bill to the tail, and a second on the flank. The scapulars, wings, the posterior aspect of the thighs, and also the face.

lores and ear coverts, are brownish-black. The under surface is uniform smoky-white, with the throat pure white. The eyes are dark brown and the legs and feet black. The bill also is black, presenting a transverse groove at about one-quarter inch behind its tip; this marks the anterior border of the bill caruncle in the adult. At the age of one week, this groove had become slightly green, and the egg-tooth had not been shed.

Fully two weeks elapsed before the young were really strong. After this period had elapsed, they were removed to the large grassy paddock at the north end of the Duck Aviary, where they have since remained. At first their sole food consisted of the tender leaves of clover and grass, all else—even the succulent worm—was refused. Later, however, in spite of the assertions of various writers, the young birds learned to take a little of the grain provided for the occasional use of the parent birds.

It is a significant fact that while the adults abhor water and never enter it unless compelled by necessity, the goslings take to their pond as freely as young ducks, although they have, apparently, no idea of feeding in it.

It is earnestly hoped that some, at least, of these interesting little creatures, will reach maturity, and in the process of growth yield many valuable facts concerning their habits and color changes.

HOW OUR WHITE MOUNTAIN GOATS WERE CAUGHT.

By CHARLES A. CHAPMAN.

It has often been remarked that if visitors to the Zoological Park could know the circumstances under which our animals have been caught in the wilds, public interest in the animals themselves would be greatly increased. Through the courtesy of Rod and Gun in Canada, we are enabled to publish the very interesting story of how the five mountain goats constituting our herd were captured in southwestern Montana, in the spring of 1905. The article appears in the magazine named above for June, 1909, on page 1194, under the caption "Catching the Kids of the Mountain Goats," and its author is Mr. Charles A. Chapman.

We are able to report that four of the original five animals are now living in the Zoological Park, in fine health. The fifth, a female, gave her life in rearing the kid that was born two years ago, and which in another year will reach adult size.

W. T. H.

Flats and running parallel with the Kootenay River, the main range of the Rocky Mountains rises sharply like a huge rock-wall to the east, pierced here and there by the outfalls of different streams such as Wild Horse Creek, Bull River, Tracey Creek, Sheep Creek and so on. Around the heads of these creeks, where they back into the deep recesses of those great mountain masses, is a wonderful game country in part covered by the new game preserve figured in your March issue. Grizzly bear, black

bear, moose, elk, sheep, goats and deer in plenty range there with as much security as do any wild animals on earth owing to the extreme ruggedness of the country. It is no holiday jaunt for weaklings to climb those mountains and suffer the hardships and rough life that is the sauce of existence for those who love the high tops and the secret something that makes a pleasure of the hardest toil.

Some months ago the front cover of "Rod and Gun" showed a picture of the mountain goats now in the Zoo at the Bronx, New York.

As I had something to say to the capture of them when they were but little kids it may interest your readers to have an account of my

experiences in the pursuit.

In the spring of 1904 I started out from Fort Steele accompanied by a Swede boy named Jimmy White. We had two saddle horses and two for packing, one of the latter being the famous Skookum, reputed the best and wisest of pack animals. We made for the head waters of White River, a tributary of the Kootenay, some sixty miles north of our starting point and pitched our camp at an elevation of some five thousand feet over sea level. Four days of the most severe and exhausting climbing resulted in four days of blank failure as far as the capture of the kids I was after was concerned. On the fifth we caught one little chap after a desperate chase amongst surroundings where the kid was all at home and we were all at sea-if I might use the expression. Still we had him, and back we fared for camp where I acted as his nurse. I had provided myself with an ordinary feeding bottle, exactly such as is used for the human kid, fitted with a nozzle, or whatever they call the arrangement out of which the nutriment is sucked. After some amount of difficulty I got it to drink a mixture of St. Charles cream and warm water, and after the third or fourth feeding all trouble as to the giving of the food ceased as the kid understood his side of the business perfectly. This relieved me of my nursing to some extent, so fitting up a little corral for his kidship we took to the tops again and after some exhausting agility amongst the rocks we got another. This one proved of the Nanny variety, and a very suitable companion for the first. I considered I had a bit of fortune in my hands and hurried back to Fort Steele where I kept them during the summer. They turned out to be wonderfully amusing pets and would follow me all over the town, though wild and shy as hawks with strangers and with dogs, especially. At first they throve well on cream and warm waterjust as I fed them in camp, but later on I found they did better on birch brush which I cut for them along the creek bottoms. They did not grow very fast and I fancied there was a chance of my over-feeding them; but as a matter of fact I now believe I did not feed them sufficiently. In the fall of 1905 I sent them to the Bronx, where, I am sorry to say, they died soon after their arrival.

Our trip had shown us that we had hit on a part of the mountains where goat were plentiful, so in the spring of 1905 we returned to our camp and began operations on a very high mountain which, as far as I know, is yet unnamed. Here we saw a considerable number of kids and chased them till our hearts were sore and our feet and hands if possible a shade more sore. We reached camp after dark weary and almost too tired to eat. Still a hot supper, a warm fire, a smoke or so and a sleep ten fathoms deep started hope in our hearts again. By daylight we were breasting the heights once more, this time with Jimmy partly dressed in goat skin. It was an idea of mine-that goat skin disguise. By and by we marked an old Nanny and a kid feeding out on a snow slide, whereupon we started to stalk as close to them as we dared. Tving a white handkerchief over Jimmy's head, to still further make him resemble a goat, I started him on his hands and knees towards the mother and kid, hoping that the mater would mistake him for an overgrown Billy of her acquaintance. I cannot say what she thought of the arrangement, but when he got within about twenty yards of the pair the old lady put down her head and came for Jimmy with vengeance in her motherly eye. Goat's horns are sharp, and Jimmy knew it. It was no fault of his that he didn't strike Sweden in three jumps, for standing up he sprang back with more hurry to the square inch inside his skin than I thought dignified. Jimmy came back, all right. But the old goat when she found what it really was, quit that region at a pace that words won't describe very easily. The kid went with her, but not all our hopes. We followed after them and about dark we caught the kid at a place where there was an overhanging cornice of rock which the old one managed to negotiate but which was too much for the little one. Back to camp was the order, arriving there after dark. Much the same experience was had with this number three kid as with those of the previous spring, but I was now becoming quite an experienced goat nurse with knowledge of the rules of the game.

During the following four days our luck was decidedly in the ascendant, as we captured one each day, making five in all. I meant to get eight if I could, but our shoes were worn so that our toes were all but visible, our clothes were fitting for scare-crow duties and no more.

Plainly it was for us to get back to civilization, but I had the education of the kids to complete in the direction of absorbing St. Charles eream and to this end erected a little corral of Jack pine about twelve feet square and covered in at the top. We called this establishment "The Nursery" and here I took up my duties. Truth to tell I had not much trouble with the little fellows and used to feed them about every



MULE DEER FAWNS.

These fawns, born in June of this year, are a valuable addition to the herd of mule deer, which now contains six specimens.

three hours day and night. If they got hungry they would either jump on me or climb all over my body—for I slept in the little corral with them. I found if I left them they got uneasy and tried all manner of ways to escape. Old Skookum, the pack-horse, seemed to take no end of interest in them, looking at them as if he had a mind to herd them. Poor little orphans, when I had them fed they would all lie down close beside me and go to sleep, I suppose, or, at any rate let me get forty winks, till hungry again when they would beat me with their fore feet. Their mothers must have a hard time with them, but not many mothers had as many as I was blessed with.

After having fully graduated on the sucking bottle, I made them three small crates and fitted them as side packs on the trusty back of Skookum, placing two kids in each of those on the sides and one on top. It was a bulky pack, and necessitated a deal of chopping by Jimmy and myself to get rid of the trees that obstructed the narrow trail down by Sheep Lake and so downwards to Sam Cadeux's place above Sheep Creek road house and the open ease of the wagon roads home to Fort Steele, where we built an enclosure about one hundred feet square close to our shack and enclosed with close wire fencing. It was something of a sight for Fort Steele people to behold those little fellows come climbing over myself and each other to get the

first drink from the feeding bottle and following me around the streets.

As in the case of the two we captured in 1904, I found they did better on birch brush (the leaves and small twigs), than any other food, though, of course, while on that class of dietry they had their cream as usual. In the fall I weaned them from the kidlike folly of mere cream and feeding bottles and began to feed them with bran and oats mixed. They got along splendidly on this, but seemed to greatly like good clover hay of which they got all they cared to eat.

I was sorry the day I parted with them to go on their long journey to the Bronx Zoological Gardens, for they were really interesting little pets. It is true they would never permit a strange hand to be laid on them, and if a stranger approached too close to them they would at once stampede to me for protection. I suppose they looked on me as their parent, or protector, or Special Providence. Anyhow, I trust they are proving a credit to my educational establishment. I did the best that in me lay to perfect them for the great outside world and the perils and pitfalls of Gotham. Here, by the way, Mr. T. T. McVittie, P. L. S., of Fort Steele, saw them the other day, and from his account of them I feel that "My Kids" are maintaining the reputation of the land of their nativity.

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THE CHINESE TAKIN.

AST year, Hon. Mason Mitchell, American Consul at Chung King, China, and now stationed at Apia, Samoa, presented to the Zoological Society, for the National Collection of Heads and Horns, the entire skin, skull and horns of the very rare and little known Takin which inhabits southwestern China. The specimen proved to represent the Chinese Takin, (Budorcas tibetanus, Lydekker), of which there are probably fewer than half a dozen specimens available for study.

For several months, the founders of the National Collection were in doubt regarding their duty to science respecting the zoological rarity so unexpectedly placed in their possession. To

mount a specimen entire and place it in the Collection, seemed like establishing an embarrassing precedent; but on the other hand, it seemed impossible to do otherwise. At last it was agreed that "the promotion of zoology" demanded the utilization of the entire animal. The specimen was placed in the hands of Mr. Wilson Potter, of Philadelphia, and forthwith he and his taxidermists began a careful study of the Takins.

The finished specimen reached the Collection last week, and the work bestowed upon it reflects great credit upon Mr. Potter. Judging from photographs of the living Takin in the London Zoo, the form of the animal has been



CHINESE TAKIN

very correctly wrought out. Fortunately, the presence of the entire skull leaves no room for argument regarding the external anatomy of the head

The Chinese Takin, which is quite distinct from the Mishmi species, is a genuine zoological oddity, like the musk-ox, prong-horn and mountain goat. It has the heavy, burly body and hump of an overgrown mountain goat, thick and clumsv legs like a musk-ox, hoofs like a Texas steer, and horns that are quite unique. The shoulder height of our specimen is fifty inches, girth sixty-seven inches, and when alive it must have weighed about 600 pounds. Its longest horn has a length of nineteen and five-eighths inches, and a basal circumference of eleven and one-half inches. The widest spread at the base of the horns is seventeen inches, and between the tips, thirteen and three-quarter inches. Mr. Mitchell shot the animal in the Province of Szechuan, western China, near the eastern bor-W. T. H. der of Tibet, in 1908.

THE SECRETARY BIRD.

By LEE S. CRANDALL.

O matter what may be the age or standing of a zoological collection, there are always certain elusive creatures which are constantly sought to increase its scientific value and interest. Whenever a special desideratum is acquired, somehow another long-felt want promptly rises to take its place. As every collector knows, one of the greatest pleasures in gathering a collection of living creatures is the sudden acquisition of a species that has eluded all efforts to procure it.

The Secretary Bird, (Serpentarius serpentarius Miller) is not the rarest bird among European zoological gardens. In fact, these birds have many times been exhibited in the older institutions, and have there gained an enviable reputation as entertainers and educators. It is said to be a popular amusement among a certain class of Englishmen to give a zoo bird-keeper a "bob" to see the Secretary Bird stamp on a rat! Under ordinary conditions, it would seem that a Secretary Bird should not be particularly difficult to secure; but it happens that as a rule every arrival in European ports is instantly purchased by some enterprising collector, and therefore living specimens are seldom offered in America.

Last winter, however, a New York dealer informed the Director that his foreign agents had secured a very fine pair of Secretaries, which he



PREPARING TO STRIKE.

The bird advances with deliberation,

offered to deliver at the Park for a sum none too modest. Needless to say, the offer was immediately accepted, not without misgivings as to the ability of the dealer to fill his contract. Great was our delight, therefore, when word was received that the coveted pair was about to be delivered at the Park! Their wings having already been clipped, they were turned at once into one of the large runs at the Ostrich House, which had been prepared for them. After a much-needed stretching of the great expanse of wing and length of limb, they graciously accepted their first meal of rats, cheerfully swallowing them whole!

The Secretary Bird is a huge ground hawk, with legs as long as those of a sand-hill crane. It is a handsome bird, stately in pose and very alert and quick in movement. When erect the male is easily four feet high, the greater part of it being contributed by his neck and legs.

In general color the bird is a soft, ashy-gray, the wings, thighs and abdomen being black, and the breast white. The gray middle tail feathers are so long as nearly to touch the ground when the bird is standing. In the male, the naked skin of the face is yellow, and the long, heavy eye-lashes well set off the handsome, gray eyes. The crowning beauty of the bird, however, lies in the two, long, black cockades which grow at either side of the back of the head. These feather tufts are said to have suggested the popular name of the species, from their supposed

resemblance to a quill pen stuck over the ear of a clerk. Vosmaer, however, who first described the species in 1769, states that the bird was known at the Cape of Good Hope as the Sagittarius or Archer, from its long strides. Sagittarius is said (but the idea seems far-fetched) to have become corrupted to Secretarius; hence the origin of the very appropriate name perhaps may be traced to accident, after all.

The zoological status of the Secretary Bird has occasioned a great deal of controversy. By various authors it has been placed in various groups, from spoonbills to bustards. Many modern authorities, however, admit its affinities with the accipitrine birds, and place it in a separate sub-order of that group. While the Secretary, at first glance, seems to be simply a long-legged hawk, very much specialized for ground hunting, the fact that a fossil form of the same genus is known from the Miocene of France, suggests the possibility of the truth of the theory advanced by Newton, that the modern bird has descended, little changed, from the ancient ancestors, not only of present-day hawks, but even of herons, storks and others.

The peculiar degree of parallel development found in the Secretary Bird and the seriemas, (particularly *Cariama cristata*), is too marked to escape notice. Both are aberrant forms of well-marked families (the seriemas being com-



THE FIRST BLOW.
The right foot is slightly raised for the strike.



FIRST STROKE OF THE BEAK.

The reptile is seized and dropped so quickly as to barely leave the ground.

monly referred to the cranes) differing radically from the types, and yet approaching each other in a most singular manner. Not the least interesting of these resemblances is the sharpened, raised condition of the inner talon of each foot, which is found both in the Secretary Bird and in the seriemas, not only in the crested, as first made known by C. William Beebe, but in the Burmeister as well. In each case, this specialized nail assists in holding the prey during the process of tearing it with the bill.

The hunting and feeding habits of Serpentarius are unusual. The killing is not done with the beak, but with the feet. The power in the long, sinewy leg-muscles is surprising. The bird strikes a hammer-like, maining blow, by raising the tarsus to a position at right angles to the thigh, and bringing it down with great velocity. In striking, both feet are used, neither being given preference, although alternation is not perfect. The talons are drawn together when the blow is started, straightened out while in the air, and brought together slightly at the instant of impact with the body of the victim, so that the latter receives not only the force of the blow, but the piercing of the sharp nails. Whenever possible, the food is swallowed entire, fur, scales and all; but if the animal should be too large, it is eaten piecemeal, the fur, if pres-



DEVOURING THE HEAD.

The bird removes the head, swallowing it entire.



FINAL PREPARATION.

Drawing the reptile under the foot.

ent, being discarded. The bird regurgitates pellets of indigestible matter after the manner of many other flesh-eating birds.

It is as a snake-killer that the Sceretary Bird has gained its greatest renown. The most fabulous tales are told of the feats of the bird as a slayer of venomous serpents, but there is no doubt that it bears a greatly exaggerated reputation in that respect. It does, however, destroy a great many of the cobras, vipers and other poisonous reptiles that infest certain portions of Africa. As the methods of attack and defense of the snake killer seemed to be so inaccurately reported and so greatly exaggerated, it was determined to attempt to learn something of the truth by experimenting with our captives.

Some small garter snakes were first introduced, all of which were quickly dispatched, with little attempt at self-protection by the Secretaries. Next in order we offered an active blacksnake about four feet long, and then the birds seemed to realize that this was no mean antagonist. The male bird, warily approaching with wings outspread so that their slightest forward movement would carry him out of danger, found that dodging the vicious lunges of the combative snake was none too easy a task.

In avoiding the reptile, the bird raised itself about two feet from the ground, its talons extended to protect its abdomen. It did not make an attempt to receive the blow on its extended wing, as has been stated by various writers. This dodging and feinting continued for several minutes, the birds circling about their intended prey, watching for an opening, but keeping well out of danger. Suddenly, the right foot of the male bird shot out with great force, striking the reptile fairly on the head and partially stunning it. The snake was by no means incapacitated, however, and the bird found it well to maintain its former caution. Soon another chance presented itself, and this time the first blow was followed very rapidly by several more, which sufficed to quiet the snake.

In this case, the talons were too wide spread to pierce the scales of the victim's head, the blow being delivered flat-footed. It would not go well with a Secretary Bird whose claws became fastened in the skin of a cobra! In such battles this bird displays another ability. It's blows are in general very accurately delivered, and always are aimed at the victim's head. If the snake's position does not change, the crushing foot is sure to find its mark.

When a snake is not too large to be swallowed entire, (and this seems to include everything under three or four feet), its head is seized by the bill of its captor, and being held down by the bird's foot, while the sharp inner claw comes into play, the body is stretched and pulled a number of times, presumably for the purpose of rendering it less rigid. It is then swallowed without further ceremony, and usually head first. The Secretary Bird is found practically throughout central and southern Africa wherever dry, open country exists. By some authorities, the northern birds are classed as a distinct species called Serpentarius gambiensis, but by others this distinction is deemed unwarranted. The birds are usually found in pairs, each having a certain hunting ground which they defend fiercely against intrusion by their neighbors. The nests are very large and bulky, built of sticks and generally placed in a thick bush, or small tree, although they have occasionally been found at great heights. Here the bluish-white eggs, usually two in number, are deposited.

The long, slender tarsi of the birds, particularly in the young, are extremely brittle, and care must be taken to prevent the sudden alarming of captive birds, lest their legs be snapped. The young are frequently taken from the nests and raised by the native farmers as pets. Their only fault in that capacity is said to be their fondness for young chickens, which often proves their own undoing.

ZOOLOGICAL GOSSIP.

WIND, rain and the moulting season have sadly bedraggled our pea-fowl, and the pride of every peacock has long since passed away in the hands of various visitors. Even though deprived of their glory, their spirit remains undaunted, and wherever a male bird finds an audience, he still makes heroic efforts to entertain it.

The dazzling appearance of the white peacocks instantly made them popular, and when their timidity had been quite overcome, they frequented the paths where visitors were most numerous. A short time ago a large crowd was gathered near the Wolf Dens, intently watching the antics of an ordinary Indian cock courting a hen, when suddenly from the shrubbery a white bird stepped into the open space. He evidently meditated an immediate conquest, for he strutted proudly before the hen and threw erect -not a whole, magnificent tail-but, alas, only a single feather. Such a shout of laughter greeted this display that his composure was completely shattered, and he turned and made a hasty retreat.

One branch of surgery that Dr. Blair is occasionally called upon to practice, is the setting of broken bones. The number of these fractures, the subjects, and the causes, present problems often of great complexity. Usually the cause is unknown, and with some of the dumb



YOUNG CHIMPANZEE.

patients it is difficult to understand just why so agile a creature could suffer such an accident as a fractured leg or arm.

Not so puzzling when the subject is a tall wading bird, for a sudden twist and the fragile leg bones are snapped. Even a mountain sheep may find himself with a broken leg by the sudden thrust of a foot into the crevice of a rock; but when a fracture occurs in the leg of a primate—and a particularly strong and active primate, such as an orang, determining the cause is difficult. During the first week of August, our youngest orang was found lying on the floor of the outdoor exercising cage, apparently suffering great pain. In the absence of Dr. Blair it was hastily concluded that the trouble was in the bowels, as the abdomen was distended.

The usual remedies were administered, but without relief. When our surgeon arrived a minute examination was then made, which resulted in the discovery of a fracture of the left femur, near its head, close to the pelvis—a particularly bad break. In fact, this is about the most serious place in which a break can occur, on account of the heavy muscles which prevent the perfect resting of the leg, and the possibility of the fracture lying within the capsular ligament. Dr. Blair reduced the fracture

and encased the leg in a plaster-of-Paris bandage, with a long splint, to secure perfect rigidity. Should the fracture be located within the capsular ligament, there is a possibility that the knitting of the ends of the bones may result in a change of the fluid and a consequent permanent stiffness of the leg. A similar accident happened to a large African monkey, but with a perfect recovery and entire use of the limb, the animal living five years after the splint was removed.

So many and varied are the cases now on record, that Dr. Blair believes that an operation for the displacement of a vertebra of some reptile alone is required to complete the entire round of possible accidents.

* * *

In July we received a chimpanzee representing the species known as Pan schweinfurthi. probably about one year old, and the smallest that we have ever seen. As shown by the picture of the little fellow in the scales, he weighs only thirteen and one-quarter pounds-not a great deal more than the average newly-born human infant. As a companion for "Baldy," the present representative of the Genus Pan, he would have fitted nicely into the order of things at the Primate House; but "Baldy's" muscular development has been so rapid that he has long ago passed the age of succoring his orphan and disconsolate brothers. Even the largest orangs do not relish a frolic with "Baldy," and lately Keeper Riley has had several very strenuous arguments with this very turbulent youngster,-not always emerging from the encounter with all of the glory. On Friday, August 12, there occurred between "Baldy" and Keeper Riley a regular battle for the supremacy of the Primate House, and we are glad to be able to report that the keeper still remains master of the situation. As the placid disposition of the orangs is more suited to hovering infants, the new baby has one of the orangs as a companion, and is quite happy with "Mimi."

In spite of "Baldy's" perversity, and decided inclination toward having his own way, he still evinces, in a sprightly and cheerful manner, an aptitude for delineating many of the accomplishments of his human associates. So aptly has he acquired some of them that the Director and Mr. Ditmars decided that he should display his intelligence in public. Each afternoon, at 4.15 o'clock, "Baldy" gravely sits at a table, upon a raised platform at the south end of Baird Court, and with great deliberation cats his luncheon. There has been no attempt to garb

the exhibition with any display that would deprive it of its ape-like character, other than to use a table, chair and eating utensils.

The ape leaves the Primate House with his keeper, and walks erect to the platform, ascending the stairs and scating himself at the table, unaided. He uses either fork or spoon, with commendable skill; devours an ice-cream cone—for which he has a decided fondness—and drinks a mixture of milk and eggs from a bottle, which he raises with a great flourish. An interesting element of the entertainment is "Baldy's" evident pleasure in performing in public. The size of the audience is in no way disconcerting. Until the accident of the fractured leg, his companion had been the injured orang-utan.

* * *

Violent exceptions to all forms of surgery, especially dentistry, are no more frequent among men than among animals. Excepting the great apes, who are always the best of patients, the practice of dentistry with certain groups, is a trying and dangerous science. As most animals make use of their teeth and claws as weapons of offense and defense, working around the head of a strong animal-even though the feet may be rendered helpless-is decidedly hazardous, Tales are frequently told of the abnormal development of teeth, tusks and mandibles that seem incredible, and yet actual observation of singular cases in the Park would convince the skeptical of their possibility, and that with care and skill, relief can always be given. A golden agouti received early this year, was so emaciated that the keepers believed it had been starved, and promptly gave it individual attention and an abundance of food. They were soon quite certain that it ate the food, but that it remained weak and thin. The case was so singular that a watch was kept, in order that the actual process of eating could be noted. After some time had elapsed, the keepers detected flecks of blood on the animal's jaws and referred the matter to Dr. Blair. The agouti was captured, and upon opening the mouth, the secret was instantly solved. The lower incisors had grown so long that they had completely passed the upper ones and were cutting into the roof of the mouth. Carefully placing a thin piece of wood laterally between the jaws, the doctor inserted his bone forceps, cutting the two teeth back to their original chisel-like shape. After cleansing the wounds, the agouti was liberated, and immediately improved and became fat upon its now properly-eaten food.

÷ * *

Technically speaking, the use of the word dentistry for an operation upon the mandibles of a bird might seem a misnomer; and yet, as the mandibles properly take the place of teeth, it may justly be termed dentistry-especially when it concerns the mandibles of a Harpy cagle, the largest and fiercest of the rapacious birds. The Harpy is rare, and like all rarities, costly. When Doctor Blair learned that the Harpy could open his mandibles only with difficulty, he was worried. With the thought of tetanus in his mind, he ordered the capture of the bird. An examination showed that at some time, possibly in his wild state, the upper mandible had been bruised, causing it to turn from the normal growing line and press so firmly against the lower as to nearly make the jaws immovable. The inner surface was carefully cut away and filed smooth. As the mandibles have now reached their normal size, it will require but a few treatments to effect a complete cure.

E. R. S.

THE BONGO.

THE National Collection of Heads and Horns has recently been enriched by a pair of Bongo horns, gift of James L. Clark—the hunting companion of Mr. Radcliffe Dugmore. According to the records of Rowland Ward, these horns are fifth in length and first in circumference.

"The Bongo," said Mr. Clark, "is not a rare animal, but is exceedingly difficult to shoot, by reason of its great shyness. The natives refuse to guide a white man on the trail of the antelope, because, as they say, he wears too many clothes to run quietly, and has not sufficient lung power to run fast. The Bongo frequents the thick bush and bamboos in the foothills of the country around Escarpment-a station on the Uganda R. R., about fifty miles from Nairobiand Eldoma Ravine, between Nairobi and the terminus of the railroad in Uganda, usually at an elevation of 5,000 to 8,000 feet. It is extremely sensitive to wounds, however slight, presumably on account of its high-strung, nervous temperament, and if followed, is frequently found dead from a trivial hurt. With but few exceptions, most of the specimens are brought in by the natives, who get them in pitfalls dug for other game. The Bongo comes out of hiding at night, and probably if one climbed into a tree and waited, they might obtain a shot. The natives are keenly aware of the worth of specimens, and put a high valuation on Bongo heads. In Nairobi a head, by no means as large as the one presented to the Society, had a market value of \$150.00."

So strict are the British hunting laws, Mr. Clark experienced great difficulty in shipping the specimens he obtained. One came through on his hunting license, but the other two were passed only upon a promise to deliver them to the American Museum,—a promise that the Government Game Ranger verified by writing to the Museum, stating that the heads were consigned to it.

E. R. S.



AFRICAN BONGO SKULL.

ZOOLOGICAL SOCIETY BULLETIN.

ELWIN R. SANBORN, EDITOR

Denartments:

MAMMAT. W. T. HORNADAY, Sc. D. AQUARIUM C. H. TOWNSEND, Sc. D.

RIRD C. WILLIAM BEEBE. REPTILE RAYMOND L. DITMARS.

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SEPTEMBER, 1910

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A FEATHERED PESTILENCE ABROAD.

In the Apia Samoanische Zeitung, Mr. Mason Mitchell, American Consul and a life member of the Zoological Society, publishes a very interesting article under the caption "A Pest in Samoa." From it, which we reproduce entire herewith, it appears that in comparison with the mynah our English sparrow is a veritable dove of peace. The inference,—be-ware of the mynah!—Ep.

Sometime since, a cage of mynah birds (Acridotheres tristris) was brought to Apia. The party who landed the birds was undoubtedly ignorant of their habits, and the consequences of his act, as they were soon afterwards liberated. They are vicious and pugnacious, besides devouring the young and eggs of other species.

Like the cuckoo, they seldom build their own nests, but prefer to eject the eggs of other birds and take possession of their building.

Honolulu at the present day is bereft to a great extent of its beautiful song and perching birds, owing to the introduction of the mynahs.

Mr. Rothschilds in his ornithological work. Vol. III of the "Avifauna of Laysan," page 300, states that the mynah "kills and eats the young and eggs of small birds."

More recently still Mr. Perkins (Ibis for October, 1901) affirms that the mynah "not only attacks and drives away other birds, but also devours their eggs and young." He adds further (p. 580) that he has himself seen the mynah "devouring both young and eggs of other species.'

Such evidence is conclusive, and establishes the habits of the bird. In addition, in China I have seen them attack smaller birds, and what they have done in other lands will doubtless reoccur here.

In Samoa we have many beautiful specimens in the avifauna of the forty-nine known species that inhabit or visit these islands. Among them are the crimson-headed honey-sucker (Sega segamau'u), and the iao, another species of the same family; the painted pigeons, manutagi and manuma, also the beautiful little loriquet of the parrot tribe (Sega samoa). These and others will be driven from the Island or devoured unless the mynah is exterminated. There are but few at present, and found in the bush back of the German Firm, but it is hoped that both whites and natives will kill them whenever opportunity offers, for the mynah is a wary bird and the traps or poison that have been tried in the Hawaiian Islands were of no avail. They multiplied with rapidity, and to-day overrun that country.

They are of brownish color and may be easily recognized by the white patches on the tips of the wings. Head and neck blackish, a bare spot of yellow behind the eye, wings barred with white, under parts and under tail-coverts white, bill yellow. Length about nine inches.

The mynah comes originally from India, and belongs to the starling family.

MASON MITCHELL.

PROTECTION OF BIRDS IN NATAL.

We are informed that the Government of Natal issued on May 28 last a proclamation amending the Act of 1896 for the protection of wild birds in such a way as to give protection throughout the year to 46 genera (including in each case all species). The effect is to protect practically all the native birds of Natal. The old Act included only six species.—London Times.

MR. DITMARS' "REPTILES OF THE WORLD."

The appearance of such a work as "The Reptiles of the World," by Raymond L. Ditmars, Curator of Reptiles in the Zoological Park, may fairly be regarded as a noteworthy event. Its chief interest is found in the fact that the effort covers a new field, and is adapted to the wants of the millions rather than to those of the scientific few.

It is a stately octave volume, admirable in typography, and very satisfactorily illustrated. It is not an illustrated catalogue of genera and species, but a book that is "readable," from beginning to end. It treats of the reptiles of the world, quite as comprehensively as could reasonably be expected in one volume of practicable size; and it affords the reader an excellent general view of the little-known world of turtles and tortoises, crocodilians, lizards and serpents. So far as we are aware, this is the first popularscientific work ever published on the reptiles of the world; and in saying this we take due note of the existence of sections on reptiles in the natural histories, and also of Dr. Gadow's scientific treatise.

Naturally, it will be to the members of the Zoological Society some cause for satisfaction that this valuable contribution to zoology has emanated from the Zoological Park, and contains scores of fine illustrations reproduced photographically from Park specimens. The volume is published by the Sturgis and Walton Company, of New York; it contains 373 pages, and nearly 200 illustrations of representative species. The author sets forth only those species that best represent the important genera, and has wisely refrained from attempting to handle a great number of forms. W. T. H.

THE LESSER VASA PARROT.

Pronounced black is the last color one would expect to find among the members of the Parrot Family, and it really is very uncommon. Its occurrence is best known among the nine species

of splendid black cockatoos of Australia, one of which, the Banksian, is represented by a very fine specimen in the collection of the Zoological Society. The highest quality of iridescent black is found among a few species of the Loriidae or Lories, but among the true parrots of the Family Psittacidae, this color is rare, and is confined to six species, five of which are members of the genus Coracopsis, the Vasa Parrots, inhabiting Madagascar and the small neighboring islands. These birds have been brought into the United States on very infrequent occasions, and the few arrivals have generally been the Greater Vasa, (C. vaza).

The Lesser Vasa Parrot, (C. nigra), is found solely in Madagascar, also the home of the Greater. The individual of the former species which recently has been added to the Zoological Society's collection, is of an ashy-black color, slightly inclining to rusty on the head. The bill is somewhat lighter in tone than the body, forming a striking contrast to the sombre plumage.

Although closely related to the gray parrots, which are unquestionably the finest talkers of the entire group, the Vasas do not appear ever to acquire any great degree of linguistic ability. Consequently they are not popular as pets, even in Europe, having the added drawbacks of rarity and funereal coloration on the wrong side of desirability. They are, however, very quiet and docile, seldom giving way to the violent spasms of rage which too often mar the pleasures of parrot keeping.

L. S. C.

ANNOUNCEMENT.

Dr. C. H. Townsend, Director of the New York Aquarium, has been appointed Acting Director of the American Museum of Natural History until December 15, 1910; Director H. C. Bumpus having been granted leave of absence until that time. Dr. Raymond C. Osburn, of Columbia University, has been appointed Assistant Director, to take charge of the Aquarium under the general supervision of Dr. Townsend.

All those interested in the work of the Society in the Zoological Park, or Aquarium, are cordially invited to become members. Information concerning membership may be obtained at the office of the Society, 11 Wall Street, at the Zoological Park or the Aquarium.



ZOOLOGICAL GARDEN, CALCUTTA.

Breeding colony of wild night herons, egrets and snakebirds.

THE CALCUTTA ZOOLOGICAL GARDEN.

By C. WILLIAM BEEBE.

THE Zoological Garden of Calcutta is situated in one of the suburbs of the city Alipur, three or four miles from the main thoroughfares. It is a Zoological Garden seen through the small end of the field glass—complete, but everything in miniature. As an example of landscape gardening it probably has few equals in the world.

It dates from the year 1875, when the Government of Bengal granted about thirty-three acres for this purpose. At present, although

under the nominal control of a Committee, consisting of doctors and civilians, it is practically a government institution.

From the Bengal Government it receives an annual maintenance grant of 20,000 rupees, while the gate receipts furnish an additional 36,000 rupees. In American coinage these sums represent about \$6,800 and \$12,000, respectively. The amount of the gate receipts seems all the more remarkable when we learn that the ordinary admission charge is one anna, about ten cents.

There are about thirty-four installations, houses most of them are called, although many are hardly deserving of more than the title of sheds, kennels

or shelters. But in this climate of perpetual summer, no more is required. The more pretentious installations have each been presented by some person interested in the Garden, and each of these bears the donor's name. For example, we have the Abdul Ghuni House for bears, the Murihidabad House for birds of paradise, and the Burdwan Raj House for the larger carnivores.

During the few brief visits to this interesting little Zoological Garden, which my pheasant studies at the Museum allowed me to make, I was able to note the more striking exhibits.

The Calcutta climate is such that few creatures hailing from cold or desert regions will long survive. If Himalayan pheasants are brought down at the beginning of November they will live for a few months and then succumb to the increasing heat. Although numerous orangutans, old and young, have been procured from Singapore, all die from tuberculosis within a short time, having contracted the disease before they reach the country. The hoolock gibbon is one of the prominent features of the Garden, both from its strange "travelling ring" method of progression back and forth across the roof of its large cage, and its human hoots and howls



LAKE IN ZOOLOGICAL GARDEN, CALCUTTA.



ZOOLOGICAL GARDEN, CALCUTTA. Enclosure for the Indian Rhinoceros.

which it sends to the farthest boundary of the Garden. These have a remarkable echo quality as when one calls in a great empty stone hall. These animals live well and are easily procured.

A small but attractive exhibit is the Peafowl Pavilion, consisting of a large wire-covered oval, with a slighter shelter in the center. In the four divisions into which this is divided are magnificent specimens of the Indian, Javan. black-winged and white peafowl, and when the males of all four are simultaneously spreading their trains it forms a beautiful sight.

Judging from the number of porcupines on exhibition, death must be unknown to them.

Thanks to a regular system of exchange with Australian Zoological Gardens, marsupials are well represented, especially tree wallabies and kangaroos, which breed freely. To see kangaroos placidly perched on the topmost branches of tall trees is a shock to one's ideas of the life of these saltatores.

The exhibition of ruminants is unusually full and complete, especially as regards I n d i a n and Chinese species. The most unusual is the Formosan deer. (Cervus taevanus), a pale grayish-brown animal of the axis type, with extremely faint spots. Small herds of the mithan. or g a y a 1, (Bos frontalis), and banting. (Bos sondaicus). I n-

cluded magnificent males, as full of fire and spirit as the most high-bred bull. An interesting, although un-geo-graphical association is that of a herd of Indian gazelles and a number of emeus peacefully feeding together in a large paddock. All the deer and cattle breed freely.

The Indian Thinoceros installation is a perfect one. Two a cres of low ground, partly shaded by palm trees and bamboos, is bounded by a low cement wall, on which one can easily rest one's elbows. In the center is a large natural morass and lily-covered lagoon, and here a splendid pair of rhinos enjoy themselves. A few years

ago a hybrid rhinoceros was born in the Garden. A single young elephant is exhibited, this animal being common in the country as a domestic beast of burden.

Of all the mammals in the Garden none delighted me more than the cat bear, or panda, (Aelurus fulgens). In color it was beautiful; in form and gait most comic. Bright golden yellow, with dark chocolate legs and underparts, the quaint, absurdly small, round face and lower lip were a conspicuous white, while the tail was very long, fluffy and ringed like a coon's. The gait was a rolling one, and a favorite sleeping posture was to lie at full length on a perch



ZOOLOGICAL GARDEN, CALCUTTA. Flying aviary for large water-fowl.



ZOOLOGICAL GARDEN, CALCUTTA. Small double aviary, Mynah in foreground.

or beam with all four legs dangling. These strange Himalayan forms are gentle and affectionate, and are now breeding regularly in the Garden.

The reptile exhibit is uninteresting. Cobras alternating with king cobras and Russel vipers in cage after cage.

Fine specimens of black and clouded leopards are the only carnivores worthy of mention, but the collection of foxes, jackals and smaller cats, as well as of squirrels, contains many rare species. The great wolf-like wild red dog, (Cyon dukhuneusis), is one of the most dangerous animals in India. The tapirs breed freely here, as do the kiangs and wild asses.

To an ornithologist from the western world, the wild birds of the Calcutta Zoological Garden vie in interest with those confined in the aviaries. The shortest walk through the Garden will reveal a score of species—drongos, wandering tree-pies, golden-backed woodpeckers, mynahs and bulbuls, in the trees; egrets and house crows perched on the backs of the ruminants; griffon vultures and kites soaring in mid-air. In a clump of trees and bushes on the shore of one of the tiny lakes is a large breeding colony of wild night-herons, egrets and snakebirds, a most enviable possession for any zoological garden.

The captive birds are scattered about in small, isolated aviaries, half hidden among luxuriant trees, flowering vines and shrubs, all of course unheated and exposed to the open air.

One circular aviary has an artistic winding cement rivulet, along whose gradually descending course are perched silver pheasants, Mandarin ducks and beautiful lories and parrakeets.

A well-planned water-fowl flying-cage fifty by seventyfive, by twelve feet high, contains a large flock of sacred and scarlet ibis-the latter breeding regularly and never losing their brilliant color. Great comb ducks, Asiatic spoonbills with fluted mandibles and scarlet eves; big gallinules sitting on their eggs, and most remarkable of all, an Indian pink-headed ducka dull, blackish bird with bill, eves, head and neck of intense pink. A weird little stone plover trots along the wire

netting, keeping pace with you as you walk around the cage, hoping for food or attention.

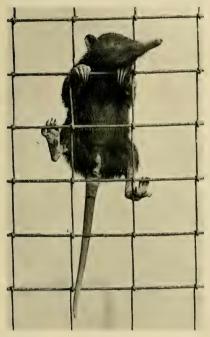
Loud cries attract our attention, Wok! Wok! Wok! Wok! and in an octagonal aviary, amid orchids and other flowers we find five species of birds of paradise, which for years have lived in perfect health. The lesser, the greater, the red, the twelve-wired, and, clad like the impeyan pheasant in pliant metal, the magnificent rifle bird. All defy description, putting to shame our mounted museum specimens.

The most pretentious building for birds is known as the Sarnomovi House. In characteristically native Indian style, we read that "this house has been erected at the cost of Maharaja Manindra Chandra Nandy, the worthy nephew and successor of the late Maharani Sarnomoyi of Cossimbazar."

On three sides of the building are as many lofty wire-covered outdoor cages, containing bamboos and banana trees. Here, or in the indoor cages, are quartered the parrots and cockatoos, the crowned pigeons, pheasants, francolins and hornbills, besides numerous smaller birds. The smaller hornbills fly about freely and do not disturb birds of the size of a jay or roller. The crowned pigeons breed every year.

A Javan jungle fowl quartered here was as brilliant as any kind I have ever seen, with an enormous drooping comb, rainbow-hued,—yellow, violet, green and blue, in close and startling combination.

In the cool of the morning, or of late afternoon, a drive out to and through the Calcutta Zoological Garden will be one of the most delightful memories of India. The splendid Indian Museum, and the tablet marking the historic Black Hole, together with the Zoological Garden, completes the list of definite "sights" which Calcutta has to offer to the visitor, although to western eyes, every street is an absorbing spectacle, every native shop a treasured memory.



SOLENODON.
Scale 1/4"=1 inch.

THE SOLENODON.

FOR the past three years we have watched with keen interest and sympathy the scientific chase of the elusive Solenodon. For a brief period the standing-offer price for living specimens was \$50 each; and for a period, the price asked in this country was cheerfully prohibitive.

But a change has come over the Solenodon market. Quite recently Mr. Franklin Adams, Secretary of the Bureau of American Republics, and his wife, Mrs. Harriet Chalmers Adams, the well-known traveller, author and lecturer, captured six specimens in Hayti, and brought five of them to New York, alive. Three of them were generously presented to the New York Zoological Park, and two to the Washington Zoological Park. The finest specimen that came to us is shown herewith. Since the arrival of these specimens we have received news of the great success last year of Mr. Thomas Barbour in his efforts to secure Solenodons for the Museum of Comparative Zoology, at Cambridge. The scientific results secured by him are now available to the world in the form of an elaborate memoir on the Solenodon genus, by Dr. Glover M. Allen.

The Solenodon is an animal about two sizes smaller than a Virginia opossum, belonging to the Order Insectivora, which contains the moles and shrews. Its nearest relatives are the shrews. At present only two species are known, one of which is found in Hayti and the other in Cuba. In appearance the Haytian animal is very odd. It has a very long, slender, conical snout; thick legs, and powerful, naked feet and claws for digging; a body like an ant-eater, and a long, naked, opossum-like tail. Its dentition is clearly insectivorian, but its strong teeth and really powerful jaws go far beyond the demands of an insect bill of fare. The Solenodon does not hesitate to crunch and devour a whole English sparrow, and its best food in captivity is said to be the heads of freshly-killed chickens. This strange creature is nominally a burrowing animal, but it is quite at home in a hollow log, or a standing tree with an interior apartment to

In captivity, thus far it appears that the life of the Solenodon is usually very brief; though one specimen has been known to live as long as a year. Our experience with our three specimens has been very tantalizing. All three of them died during the first week following their arrival, despite the elaborate attention that was given them by men skilled in the care of difficult animals. Dr. Blair's autopsy revealed, as the cause of death, a large stock of internal parasites of a kind new to him, which had invaded the peritoneum, and even the stomach itself, and produced acute peritonitis, which was the cause of death.

Of course the time will come when Solenodons will be obtained in goodly numbers, and settled down in captivity for exhibition. In such cases as the present, a thorough breaking of the spell that originally binds every new species soon leads to more specimens, and better knowledge regarding their care. Five years hence Solenodons should be as plentiful in zoological gardens as sloths now are.

W. T. H.

Zoological Park Calendar.

June 21 to August 15, 1910.

Births,—Three American Elk; two White-Tailed Deer; one Fallow Deer; one European Red Deer; four Rainbow Boas.

Accessions.—Manmals.—One Chimpanzee; two Entellus Monkeys; four Vervet Monkeys; one Chacma Baboon; one Black Ape; one Two-Toed Sloth; one Ring-Tailed Lenur; two Elands; one Florida White-Tailed Deer; one Sea Lion; one Black Bear; three Cape Hyrax; one Mongoos; one Common Opossum; one South American Opossum; three Solenodons; two Striped Zorillas; one African Porcupine; one African Hare; three African Ground Squirrels; four Sumatran Squirrels.

Birds.—One Jardine Parrot*; three Pileated Herons*; two European Jays; two Quail Finches; one Long-Tailed Glossy Starling*; one Masked Wood Swallow*; two White-Eyebrowed Wood Swallows*; One Barnard Parrakeet*; one Vinaceous Amazon*; one Red-Cheeked Coly; three Ruffs; two Bank Mynahs*; two Green-Winged Glossy Starlings*; two South African Thicknees*; two Secretary Birds*; one Superb Calliste; one Brazilian Silver-Beak Tanager*; six Sooty Terns; one Noddy*; one Black Parasite Cassique; two Horned Screamers*; one Scarlet-Headed Oriole*; four Giraud Flycatchers*; one Derby Kiskadee*; four White-Throated Kingbirds*; one Red-Billed Pigeon*; two Mourning Doves; one White-Necked Flycatchers*; two Ferruginous Pygmy Gwls*;

Denotes species new to the collection,

two Golden-Breasted Buntings*; one Cinnamon-Breasted Bunting*; one Cape Bunting*; two Mexican Brown Jays*; one South American Condor; one Maguari Stork; two Marsh Hawks; one lesser Vasa Parrot*; two Kock Doves; one Hooded Siskin; one Pin-Tailed Nonpareil; one Reichenow's Yellow-Shouldered Weaver*; one Ariel Toucan; two Blue-Bearded Jays*; four Gouldian Finches; two Bronze-Winged Pigeons*; two Australian Crested Pigeons; two Yellow-Bellied Parrakeets*; two Black-Backed Gallinules; one Cheer Pheasant*; two Indian Wood Ibises; one Anderson Pheasant.

Reptiles.—One Box Tortoise; three Radiated Tortoises; one Muhlenberg Turtle; one Spotted Turtle; one Terrapin; two Snapping Turtles; four Alligators; three Rough-Eyed Caimans; one Broad-Nosed Crocodile; one Keeled Lizard; one Gila Monster; six Horned Toads; one Carpet Python; two Hog-Nosed Snakes; four Copperhead Snakes; four Garter Snakes; three Chieken Snakes; eight Pine Snakes; three Ring Snakes; one Corn Snake; one Coachwhip Snake; one Blacksnake; one Green Snake; two large shipments of reptiles from London.

MEMBERS NEWLY ELECTED.

June 16 to August 15, 1910.

Easton, Charles P. Ledlie, George Mitchell, A. M. P. Packard, Mrs. E. W. Pouch, A. B. Ryle, Graham Schaff, Hermann Slaughter, R. B. Smith, Erskine M.



CLASS FROM PUBLIC SCHOOL NO. 177 AT THE ANTELOPE HOUSE.

PUBLIC SCHOOL VISITORS.

THE growth of an institution upon the scale projected by the Society in the Zoological Park, has no doubt often occasioned mental inquiry as to its ultimate purpose. To many, a satisfactory answer would be,—"A pleasant place to spend a day"; but to the great majority, its possible value as an educational factor would strongly appeal.

It would be an idle thought, indeed, to imagine that such a concentration of effort would have been made for the purpose of amusement alone. The "menagerie" and the "show" furnish that; the Zoological Park is neither.

Ten years ago the Society experienced difficulty in convincing its critics of the educational possibilties of a great collection of animals. To



CLASS FROM MORRIS HIGH SCHOOL.

the layman, any zoological collection embodied but one thought, a prison for the animal and a their turn are preyed upon by small carnivores especially equipped for that purpose.

"As the proof of the pudding is the eating," the general attendance for ten years—over 11,000,000—would indicate that the educational value of the Park is thoroughly known. Our statistics include a carefully kept record of classes from the public schools and from many of the public institutions of New York City and the surrounding country, which also contributes a fair percentage.

All these classes are not only cordially welcomed, but are encouraged to come on the days when no admission is charged, in order that they may see all the collections at the least possible expense. The figures appended herewith will prove conclusively to what extent the Zoological



BOYS FROM THE SHELTERING GUARDIAN SOCIETY.

mob to watch either its struggles for liberty, or pitiful resignation to its fate.

Since that time, the development of the Park has been sufficiently broad to convince not only the critics but the world at large that such a collection could be made upon lines that are a radical departure from those of the typical zoo; to exhibit the animals and not imprison them, and to so arrange the species as to show their places in the zoological scale, with elaborate labels accurately describing their function in maintaining nature's equilibrium. To make this arrangement more graphic, groups have been selected to show the species that depend for existence upon certain forms that are destructive to crops; the rodents that destroy grain, that are themselves devoured by reptiles; and the reptiles that in

Society has contributed to the cause of education in New York:



CLASS FROM WEST FARMS PUBLIC SCHOOL.



CLASS FROM PUBLIC SCHOOL 22 SHERIFF STREET, ON BAIRD COURT.

1909 and 1910.	Classes.	Pupils.
Public Schools, Greater New York	. 310	12,396
Suburban Schools	37	1,065
Other Institutions, City and Suburban	221	9,552
	 568	23,013

These figures represent only the children who have visited the Park in bodies, either from schools or public institutions, in charge of teachers or officers, and are not to be confused with the uncountable thousands of young people that form a great portion of the daily attendance throughout the year. It has become generally recognized by the citizens of New York that the Zoological Park is a safe place in which children may spend their time. It may be innocently spent, and profitably, as well.

E. R. S.



RED CROSS DAY CAMP, VANDERBILT CLINIC, AT THE LION HOUSE.

ZOOLOGICAL SOCIETY BULLETIN

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ADAPTIVE COLOR CHANGES AMONG FISHES.*

By Dr. F. B. SUMNER,

DIRECTOR OF THE U. S. FISHERIES LABORATORY, WOODS HOLE, MASS.

Illustrated from photographs by Dr. Sumner.

N the Thirteenth Annual Report of the New York Zoological Society, Dr. Charles H. Townsend has described and figured some of the color changes undergone by fishes of a number of species in the New York Aquarium. Now, such changes as form the subject matter of that article, although of great interest in themselves, probably have no adaptive significance in the majority of cases. They are nervous re-

flexes, called forth by some disturbance of the fish, and may be of no more utility to the animal than are blushing and various other manifestations of emotional excitement in ourselves.

The present writer has devoted considerable study to the color changes of certain species of flounders, with especial reference to the influence of the bottom on which they lie. The most striking results were obtained from a member of the turbot group, Rhomboidichthys podas, occurring in the Bay of Naples. It was found that this fish not only adapted itself to the general color tone of the background, but to the texture and pattern as well. Thus most specimens not only assumed a very dark shade upon

*The general results of these investigations were presented before the American Fisheries Society, New York, September 28, 1910. A fuller and more technical account will be published shortly. The studies were made, for the most part, at the Naples Zoological Station.

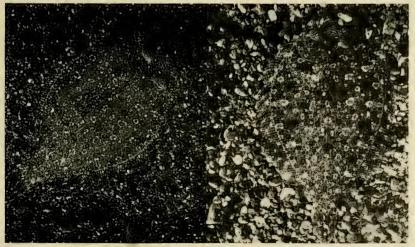
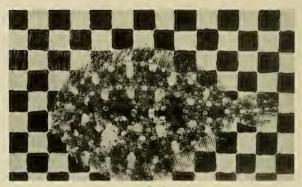


Fig. 1. Fig. PHOTOGRAPHS OF THE SAME FISH ON DIFFERENT BOTTOMS.



FIGURES 3, 4 and 5 ARE DIFFERENT VIEWS OF A SINGLE FISH, THOUGH A DIFFERENT SPECIMEN FROM THAT SHOWN IN FIGURES 1 AND 2.

a black bottom and a very pale shade upon a white bottom, but exhibited one color pattern upon sand (Fig. 1), another upon fine gravel (Fig. 2), and yet another upon a bottom of small stones. A number of entirely artificial bottoms, such as variously painted strips of glass, were also employed in these experiments, sometimes with rather surprising results. For example, the skin patterns were found to vary both with the relative amounts of black and white in the background, and with the degree of subdivision of the areas of the latter. Comparison of Figures 3 and 4 will illustrate this point.

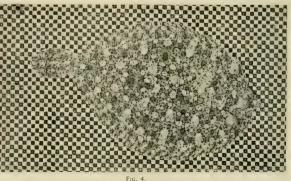
Now this capacity of the fish to adapt itself to different backgrounds, although at times very striking, was restricted within certain definite limits. In general, brilliantly colored backgrounds seemed to be beyond the fish's power of

imitation. The animal appeared to be limited almost wholly to the black, white, gray and brown of its customary habitat. Then, too, the creature was found to possess permanent spots and markings, due to the special grouping of the pigment cells in its skin.* These

This power of adaptation was best shown upon such backgrounds as formed a part of the natural habitat of the species. It was not, however, restricted to such cases, but the pigment was at times disposed in ways which, it is safe to say, were quite foreign to the previous experience of the race. For example, the nearly white and perhaps also the darkest condition attained by the fish, likewise the vividly contrasted black-and-white condition, without intermediate shades (Figures 3 and 5) which was assumed by certain specimens upon some of the artificial backgrounds. Thus, the notion that the fish is limited to a few stereotyped responses, representing the most familiar types of habitat, must be rejected at once.

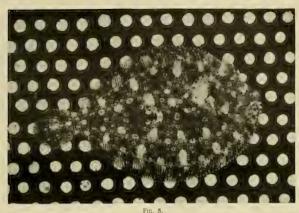
The individuals used differed greatly in their powers of adaptation, and some seemingly nor-

^{*}The color changes of fishes are due to the movement of the pigment granules within the chromatophores, or color cells, under the influence of stimuli transmitted through nerves. The chromatophores them selves probably do not change either in shape or position.



SAME FISH AS IN FIG. 3, ON A DIFFERENT BOTTOM.

proved to be fixed morphological structures, however much they might vary at different times in their relative intensity. Even when the fish was adapted to a perfectly uniform background, the outlines of these spots were for the most part dimly visible, and when they reappeared they always had the same form and occupied the same position. Under such circumstances, we could not reasonably expect that squares, cross-bands, circles, etc., should be copied in any true sense by the fishes, and as a matter of fact they were



SAME FISH AS FIGURES 3 AND 4, ON A DIFFERENT BOTTOM.

mal specimens possessed this power in a very limited degree. Again, the same fish acquired with practice (if we may use the expression) the power of changing more rapidly than at first. The time necessary for a radical change of shade or of pattern ranged from a few seconds to several days.

Experiments with fishes which had been deprived of their sight showed clearly that it was through the eyes that the stimuli were received which were necessary for the adjustment of the animal to its background. This, however, had already been clearly proved by earlier students of color changes.

A word in regard to the utility of this power of copying the background in the life of the organism. It is difficult to doubt either that this faculty has some use, or that it has in some way been developed because of its use. The end attained seems to be concealment and nothing else. Whether the object of this concealment is primarily offensive or defensive cannot, however, be stated without a greater familiarity with the animal's mode of life. It is not unlikely that both ends are attained, for we know, on the other hand, that flounders devour smaller fishes, and on the one hand, that they themselves become the prey of sharks and other large species.

TRANSPORTING LIVE ANIMALS WITH THE AID OF OXYGEN.

Photographs by Oehlrichs & Co. made at the N. Y. Aquarium.

A VERY interesting experiment in the transportation of aquarium specimens has recently been made by Mr. Emil Gundelach of Gehlberg, Germany, with the assistance of

the New York Aquarium. Arrangements were made through the forwarding house of Oehlrichs & Co. of this city for the shipment of living specimens from the Aquarium to Mr. Gundelach's home in Germany, in the following manner:

Sixteen three-liter glass jars were filled with water and the specimens introduced. The jars were then inverted under water, as in a pneumatic trough, and oxygen gas introduced to replace the water until the jars were about one-third full of the oxygen. The jars were then tightly corked and covered with

parchment to prevent any escape of the gas. They were packed in crates and shipped at once on the North German Lloyd steamship Kaiser Wilhelm der Grosse on the morning of September 13.

The list of specimens used by the Aquarium in this experiment was as follows:

Common sunfish. (Eupomotis gibbosus), in fresh water; variegated minnow, (Cyprinodon variegatus); cunner, (Tautogolabrus adspersus); beau gregory, (Eupomacentrus leucostictus); star corals, (Astrangia danae); sea anemones, (Sagartia lucia); tunicates, (Molgula manhattensis); common shrimps, (Crangon vulgaris); horseshoe crabs, (Limulus polyphemus), a couple of dozen of young just hatched, and one so large that it could not straighten out in the jar; fiddler crabs, (Uca pugnax), several specimens in wet sand with an atmosphere of oxygen.

This widely varied selection was purposely made by me to test the possibilities of the experiment.

An extract from Mr. Gundelach's letter of September 26, acknowledging the receipt of the specimens, shows what success was met with. "The collection arrived at Gehlberg on the evening of September 22. Notwithstanding the length of time (over nine days) the specimens reached my home in safety. The beau gregory and the cunner got chilled because the temperature was too low, and both of these fishes died the next day, but all the other specimens live and are in the best of condition. It is very im-



INTRODUCING OXYGEN FROM THE STEEL BOTTLE INTO THE GLASS JAR.

was probably weakened by confinement for so long a time in its very narrow quarters, and possibly the oxygen supply ran a little short. Of course the journey was made entirely without food.

Mr. Gundelach had previously made successful experiments in shipping for the shorter distances in Europe, but nothing paralleling the present experiment has thus far been undertaken. The particular advantage in this method is that specimens can be sent apparently any distance without any care whatever during transit, and so doing away entirely with the expense of an attendant or any special machinery for aerating the water. R. C. O.

AQUARIUM EXHIBITS.

THE collection of living animals is at present the most complete in the history of the Aquarium, and without doubt presents the greatest display of living fishes

portant that the experiment has succeeded, and you can now exchange any specimens with any European institution in this

way.'

In order to learn what losses, if any, might be laid to temperature, Mr. Albers, second officer of the ship, kindly consented to make daily records of the temperature of the room in which the crates were placed throughout the voyage. His report indicates a gradual decrease from 73° to 66° Fahrenheit, and Mr. Gundelach informs me in his letter that it was as low as 63° in Germany at the time the specimens arrived there. The beau gregory, being a tropical fish, evidently did succumb to the cold, but the cunner is a northern form and the same explanation will not apply. The specimen was probably too large for the jar and the supply of oxygen. It was the largest fish sent and was selected to test the size limit. It did not, however, suffocate during shipment, but it



ever brought together in any aquarium.

SHIPPING CRATES, WITH JARS.



SHIPPING JAR WITH SPECIMEN.
The upper third of the jar contains pure oxygen

The freshwater fishes are exceptionally well represented. A splendid series of the black basses showing the growth by years, from the fingerling stage to the fourth year, is the gift of Pennsylvania State Fish Commission through the kindness of Commissioner W. E. Meehan, who also contributed a good collection of yearling vellow perch. All of these were reared in the state hatcheries of Pennsylvania. An unusual display of albino lake trout was presented by the New York Forest, Fish and Game Commission, through Dr. T. H. Bean, State Fish Culturist, and formerly director of the Aquarium. The South Side Sportsman's Club has contributed a fine lot of highly colored brook and rainbow trout. The freshwater series has been still further augmented by exchange with the Detroit Aquarium and by local collections.

The local saltwater fishes have been increased by our own collectors. Particular mention may be made of the orange file-fish. (Alutera schoepfi), as an unusually large number of these weird fishes was taken during the summer. Some of the specimens were nearly pure orange, whereas in the ordinary coloration the upper half of the body is heavily mottled with brown. Forty more of the peculiar and interesting little sea-horses were obtained by purchase from Atlantic City, N. J., to add to those already on hand, making eighty-five on exhibit. These unfish-like little creatures form such an attraction for visitors that two tanks are kept stocked with them in different parts of the building. Some of our present specimens have lived in the Aquarium more than two years.

The exhibit of Bermuda fishes has been greatly increased by several shipments during the past summer so that they now form a most attractive display.

Among the Amphibia a rather unusual feature is a tank of small frogs, sixteen months old from the egg or four months from the tadpole, which were reared in the Conneant Lake Hatchery as a part of an experiment in frog culture, and presented to the Aquarium by Commissioner Meehan of Pennsylvania. Judging by the appearance of these specimens the experiment bids fair to be eminently successful.

The three specimens of the nearly extinct West Indian seal, Monachus tropicalis (Gray), which were received at the Aquarium June 14, 1909, appear to be in the best of condition. The two younger ones have nearly doubled in size since they came. All three shed their coats during the summer and were quite ragged looking for a time, but are now as sleek as usual. They are fed twice a day on herring and cod, the smaller fishes being fed whole.

The large striped bass, Roccus lineatus (Bloch), of which fifty-five specimens were placed in the Aquarium May 14, 1894, are still represented by seven specimens. These fishes were approximately two years old when they were placed in the pool, and they are thus more than eighteen years old. Although they have been well fed all the time, they have not attained nearly so large a size as they are known to reach in the open sea, probably due to confinement in limited quarters. The largest that have died measured thirty-five inches and weighed

seventeen and one-half pounds. Two have died during the past summer, but the others seem to be in good condition.

A census of the inhabitants of the Aquarium, made a short time since, showed the following numbers:

	Species	Specimens
Fishes	108	2344
Amphibians	11	107
Reptiles	19	160
Mammals	2	4
Invertebrates	24	815
Total	164	3430
		R. C. O.

CICHLID FISH AT THE AQUARIUM.

In the fresh water rivers and lakes of Central and South America the members of the family Cichlidae take the place of our sunfishes and basses. The species, which are very numerous, are mostly referable to the closely related genera Cichlosoma and Heros. Our specimen proves to be Cichlosoma hedricki, (Meek), described by Dr. S. E. Meek in 1904 in his Freshwater Fishes of Mexico.

No species of this family have ever reached the New York Aquarium until the present summer when (about the last of June) six small specimens arrived. These were purchased from a boy who brought them all the way from Vera Cruz, Mexico, in a two quart tin bucket. The largest of the specimens at the time of arrival was about two and one-half inches long. They were placed at once in one of our balanced aquaria where they have been ever since. When the specimens arrived their colors apparently were not fully developed, but they have grown rapidly in captivity and the colors have become brilliant, especially in the males.

Fresh water fishes are not so well known as marine fishes for their ability to change their colors. This species, however, exhibits this phenomenon to quite a marked degree. The chromatophores or color cells not only have a remarkable range of contraction and expansion of the color granules for a fresh water fish, but they are under such control of the nervous system that they operate instantaneously.

The ordinary background coloration of olivaceous varies from dark olive to very pale olive. and this is often covered, especially on the head, with vellow, more or less bright. There are about eight vertical dark bands on the body besides four others across the top of the head and nape, and a dark lateral band extends backward from the opercle. There is also a dark spot at the base of the caudal fin. All of these dark markings vary exceedingly. Sometimes they are very prominent and again almost wanting. Frequently a prominent black spot appears surrounded by a lighter area on the middle of the side. The lateral band usually extends back to this spot but it may extend to the base of the tail or it may fade out until almost invisible. A brilliant blue color appears on the opercle, about the mouth and on the ventral fins, and this may disappear entirely. The vertical fins and the upper part of the body are beautifully flecked at times with an irridescent metallic blue and this may also vanish completely.

There must, then, be at least four kinds of the chromatophores containing the yellow, green, blue and dark pigments, and these are all separately under the control of the nervous system, since the color changes may involve any one color only, or two or all at the same time.

The majority of these color changes can hardly be explained by assuming that they are adaptive to the surroundings. It is observed, however, that the fishes become almost uniformly pale olivaceous, and suppress all bright and striking colors and marks when frightened. This change probably renders them less conspicuous against the bottom and among vegetation in their natural environment and adds to their chances for escaping when pursued by their enemies. In the absence of positive evidence, however, it is useless to speculate.

A few of the cichlid fishes are herbivorous and have chisel-like teeth for the purpose of biting off vegetation, but the majority are carnivorous and have pointed teeth. Our species belongs to the latter class, and will eat crushed clam and meal worms with avidity.

They are among the hardiest fishes in the Aquarium, as far as crowding is concerned at least, for they have thriven and grown well in a small balanced aquarium. Though they were taken at a venture they have proved to be among the most interesting small fishes of our collection.

R. C. O.



THE WRECKFISH OR STONEBASS.

Photographed at the American Museum of Natural History.

WRECKFISH OR STONEBASS.

Polyprion americanus.

It is a rare occurrence for a European species of fish to wander across the Atlantic Ocean and be captured in American waters, though a few such cases are on record. Considerable interest therefore is attached to the fact that specimens of the wreckfish have on two occasions appeared on this side of the Atlantic. The first of these was captured many years ago by the United States Fish Commission in the Gulf Stream off the Grand Banks. A second specimen has recently been taken (August 21, 1910) eight miles off Asbury Park, N. J. This fish was first seen swimming at the surface and Captain Harry Maddox of the yacht Carib east for it. It took the book readily and was hauled on board. It weighed thirteen ounces and was about ten inches long. Like the one formerly taken by the Fish Commission it was a young specimen, as adults reach a length of four or five feet.

The young fish, which are strikingly colored with bright yellow, mottled with black, live in shallow water about rocks or floating timbers. Adults live at some depth. What should cause a fish to wander so far from its native habitat is of course problematical, but it seems reasonable to suppose in the case of this fish, whose habits lead it to swim beneath floating timber, that it has gradually worked its way across the Atlantic in company with drifting wreekage. Certain tropical fishes, find their way more or less regularly to the southern New England coast amongst the Gulf weed, (Sargassum bacciferum), carried by the Gulf Stream. Easterly winds drive the floating bunches of weed upon

our shores and the fishes are thus brought far out of their natural range, only to succumb to the rigors of winter and perish. By whatever devious course the little wreckfish reached our shores, its presence here is interesting, for it is the first record of its capture near the shores of the United States.

The specimen was sent to the Aquarium for identification and later to the American Museum of Natural History for preservation.

R. C. O.

THE SAILFISH.

Dotiophorus nigricans.

THE sailfish is a relative of the swordfish. which it resembles in having the upper jaw elongated into a sword. This weapon is not so long as that of the swordfish, but is said to be used in the same manner. The sailfish is much more slender than the swordfish, and it takes its common name as well as that of the genus from the fact that the dorsal fin is extremely high and large. The fin is not used to assist in locomotion as a sail at the surface of the water—an error often repeated in unscientific papers. The species is rare in the middle Atlantic but has been recorded at Woods Hole, Mass., and Newport, R. I. Only a single specimen has been recorded from New Jersey, one measuring two feet in length, taken at Sea Isle City in 1906. Recently a specimen nearly seven feet long was received at the Aquarium, the gift of Mr. Garrett Hennessey of Long Branch, N. J., who took it in a pound net.

As the specimen was dead when it arrived, it was presented to the American Museum of Natural History for preservation. The sailfish inhabits the warmer waters of tropical and subtropical seas. Unlike its relative the swordfish it is said to take the hook readily and to afford the angler plenty of excitement, often spiced with considerable danger.

R. C. O.

OBITUARY.

Mr. L. B. Spencer, for nearly sixteen years aquarist at the New York Aquarium, died at his home on April 16, 1910, at the advanced age of 73 years. Mr. Spencer's connection with the Aquarium began on May 1, 1894, and during this long term of service he made many friends among the visitors.

ZOOLOGICAL SOCIETY BULLETIN.

ELWIN R. SANBORN, EDITOR.

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MAMMAL W. T. HORNADAY, Sc. D. AQUARIUM C. H. TOWNSEND, Sc. D.

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NOVEMBER, 1910

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ENLARGEMENT OF THE AQUARIUM.

In the spring of 1910 the Executive Committee ordered a revision of the Aquarium plans, and Mr. J. Stewart Barney has prepared the accompanying preliminary sketch showing the general plan of the Aquarium on the ground, first and third floors, with the administration offices, lecture hall and library. The proposed revision reduces the amount of additional space required to be taken from Battery Park, and at the same time practically preserves the present Aquarium building in its entirety.

The new building will approximately treble the present amount of exhibition space and will

be adequate to meet the requirements of the enormous crowds which visit the Aquarium. It will also afford space for the administrative and scientific work which has been forced upon the Aquarium as a public museum, and which is now carried on under a great strain owing to the inadequate facilities.

The plans shown here are provisional and have not yet been passed on by the Committee. They will be thoroughly studied and Dr. Townsend will be asked to inspect all the existing aquariums abroad. The plans will then be put in final shape and brought before the Board of Estimate and Apportionment. It is needless to say that when finished an aquarium constructed along these lines will far outrank any existing institutions of its kind.

AMERICAN FISHERIES SOCIETY.

The Fortieth Anniversary Meeting of the American Fisheries Society was held at the New York Aquarium on September 27 and 29. On the intermediate day, September 28, the Society met at the American Museum of Natural History. Nearly one hundred members were in attendance, coming from as far west as Colorado and Minnesota. Canada was represented by several members, and one was registered from Honolulu.

Among the better known visiting members were Dr. Theodore N. Gill, the eminent ichthyologist of the Smithsonian Institution; Prof. S. A. Forbes, Director of the Illinois State Laboratory of Natural History; Dr. B. W. Evermann, Chief of the Division of Scientific Inquiry of the U. S. Bureau of Fisheries; Prof. Wm. Alanson Bryan, College of Hawaii, Honolulu; Hon, Kelly Evans, Commissioner of Game and Fisheries, Ontario, Canada; Hon. W. E. Meehan, Commissioner of Fisheries of Pennsylvania; Hon. John W. Titcomb, Commissioner of Fisheries of Vermont: Dr. Geo. W. Field, Commissioner of Fisheries and Game of Massachusetts; Dr. T. H. Bean, State Fish Culturist of New York, and Hon, Jas. Nevin, Superintendent of the Wisconsin Fish Commission.

After the meeting was called to order by the president, Hon. Seymour Bower, Superintendent of the Michigan Fish Commission, the Society was welcomed to the Aquarium by the Director, Dr. Chas. H. Townsend, who then presented an address on The Conservation of our Rivers and Lakes.

The number of papers presented was so large that, notwithstanding several were read by title, three full days were required to cover the program. The contributions covered nearly all phases of fisheries work. Some of the most important subjects treated were: the prevention of water pollution, conservation of fisheries, methods in practical fish, frog and lobster culture, the enforcement of fisheries regulations, the Alaska seal fisheries, the biology of fishes, diseases of fishes, etc.

The work of this body is thus not only very broad, but it is extremely important in affording a clearing house for the ideas of the men who are engaged in studying the manifold questions connected with the biology, cultivation and conservation of our valuable aquatic animals.

The society had its origin forty years ago in the American Fish Cultural Society, which held its first meeting December 20, 1870, in New York City. It thus arose at the time when the U. S. Fish Commission (now the U. S. Bureau of Fisheries) was being organized by Prof. Spencer F. Baird. The intense enthusiasm for the study of fisheries problems with which Professor Baird fired all those with whom he came in contact, was as largely responsible for the organization of the society as it was for that of the government work. Concerned in the formation of the society also were Wm. Clift. Robt. B. Roosevelt and Eugene G. Blackford, all early presidents of the society and men deeply interested in the practical development of our fisheries.

The work of the society, in its earlier years, was largely confined to methods in fish culture, but it has extended so as to embrace all problems connected with fish and fisheries of whatever character. With this growth in the work of the organization the name was changed to the present one some years ago.

The membership of the society, which now numbers more than five hundred, includes the names of nearly all the officials of the Burcau of Fisheries and of the various state fish commissions, as well as those of biologists, anglers and practical fishermen.

It was fitting to hold this anniversary meeting in New York Citv where the society first met and organized. The New York Zoological Society provided a luncheon for the members on Tuesday, and on Wednesday the American Museum entertained the society at luncheon in the Darwin room. The arrangements for the meeting were in the hands of a special anniversary committee, of which Director Chas. H. Townsend and Assistant Director Raymond C. Osburn of the New York Aquarium were members, and the same committee will have charge of publishing the proceedings of this meeting.

Hon. W. E. Mechan, State Fish Commissioner of Pennsylvania, was elected president for the coming year, and St. Louis, Mo., was selected as the next meeting place.

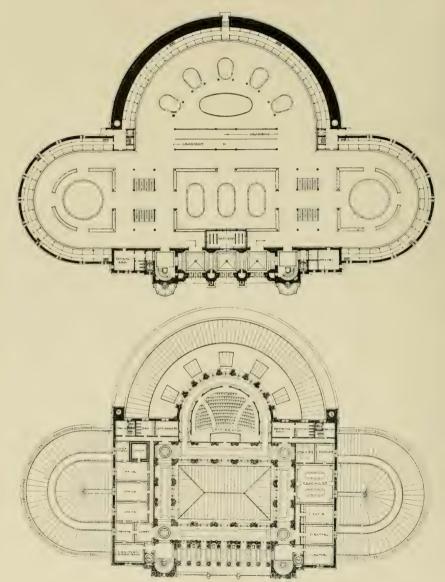
R. C. O.

STREAM PROTECTION IN EUROPE.

A dramatic example of the results of protection of streams from pollution, even in large towns, came under the notice of the writer during the past summer. The Oos is a small river which runs for a considerable proportion of its course through the town of Baden Baden in the Black Forest of Germany. The district around it has been known and settled since Roman times, although the river heads back into a forest covered mountain. In Baden Baden the banks are not only made of dressed stone, but for a half mile or more the bottom has actually been paved with stones. A series of small cascades, equipped with fish ways, vary the course of the river, but in appearance it is a stream of no special attraction except for the clearness of its water.

At the head waters there has been for some ten or fifteen years past a small fish hatchery, and trout, including some American species, are annually liberated in the stream. As a result the river, in spite of the fact that there appears to be little food for fish, actually swarms with trout, chiefly the European brown trout, running three or four to the pound. These fish are in plain sight under the main bridge of the town of Baden Baden over which foot passengers and vehicles are continually passing. Any day during the past summer there could be seen half a dozen brown trout, measuring a foot in length, and two or three large rainbow trout which certainly must have weighed fully four to six pounds apiece. These fish were objects of great curiosity to passers-by, and seemed to be entirely without fear. No one disturbed them and they rose voraciously to any food or attractive object thrown into the stream. In their confidence in the good will of humanity the fish resembled the squirrels in Central Park. So far as could be learned fishing licenses could be had for a small sum, but no one cared to fish publicly in the stone paved stream in the center of the town. In the upper stretches of the river the fishing was said to be exceptionally good.

It is probable that under existing conditions in America, where our enforcement of the law is very slack, no such protection in a thickly settled town could be extended to fish. The enterprising small boy would unquestionably get these confiding fish out of the river on the first



GROUND AND SECOND FLOOR PLANS OF PROPOSED ENLARGED AQUARIUM. From drawings by the architect, J. Stewart Barney.

dark night; but the fact that fish like trout could live in a stream under these conditions shows what could be easily done by a little stocking and protection in many American streams and rivers. First of all the streams themselves would have to be protected from pollution, not merely from sewage in the cities, but from chemical waste and sawdust in the country districts.

Whether or not we can ultimately afford to set aside large tracts of land for the protection of game animals outside of forest reserves, may possibly be questioned, but there can be no discussion whatever of the wisdom of protecting our streams so that the planting of fish fry will not be rendered futile by filth and carelessness.

M. G.



FRONT ELEVATION OF THE PROPOSED ENLARGED AQUARIUM.

Preliminary sketch by the architect, J. Stewart Barney.

AN AMBIDEXTROUS FIDDLER CRAB.

THE males of the fiddler crabs of the genus Uca (Gelasimus) have one chela or pincher very greatly enlarged and elongated. The other claw is small, and in the female both are small. The large claw, which may be either the right or left one, is used by the male in fighting and is carried always well advanced before the body. The species are only semi-aquatic and burrow in sand or mud near the water, often in very numerous colonies. In spite of their warlike appearance they consider "discretion the better part of valor" in the presence of larger enemies, and the vibration caused by a person's footsteps is sufficient to send them scampering for their burrows. When they are numerous they make a very noticeable rustling sound as they race toward their places of concealment. As they retreat sidewise into their burrows the last thing visible is the large claw held threateningly up to warn the supposed pursuer of what he may expect if he approaches too closely. When the crab emerges again—all the danger

presumably past—the big claw is the first part to become visible, in readiness for any lurking foe. There are three species of the fiddlers in our region. One of these, *Uca pugnax*, is abundant in its proper habitat, and numerous specimens are on exhibition at the Aquarium, apparently quite at home in a glass box of damp sand.

The purpose of this article is, however, not so much to call attention to the habits of the species as to record a very unusual specimen of *Uca pugillator* (Latreille) taken by Mr. John J. Ridgway at Rockaway Point, Long Island.

Instead of the usual one large and one small claw, this specimen is abnormal in possessing two large claws of equal size and normal shape. As far as can be observed no other abnormalities are presented.

The behavior of this specimen was in all respects similar to that of the normal unsymmetrical ones, among which it was found living.

It sidled into a hole with the usual celerity, but not rapidly enough to escape the quick eye of Mr. Ridgway, who noticed the unusual sym-



NORMAL MALE AND FEMALE OF UCA PUGNOX AND ABNORMAL MALE OF UCA PUGILLATOR. Photo by Mr. Chapman Grant.

metry and accordingly dug the crab out and brought it to the Aquarium in search of information.

R. C. O.

A MARINE GOLDFISH.

Apegon sellicauda

A LITTLE tropical salt water fish having the true goldfish color was received at the Aquarium the last week in July, the gift of Dr. A. G. Mayer, Director of the Carnegie

Laboratory for Marine Biology.

The golden color pales to silvery below, as it does in the real goldfishes. There is a rounded black spot on either side below the second dorsal fin, as well as a saddle-shaped blotch on the upper part of the caudal peduncle which suggested the specific name sellicauda. The species is a rare one and was not described until 1890. The specimen received at the Aquarium was an unusually large one, about three inches in length and was taken at the Tortugas Islands. Florida. Although it had lived in confinement at the Carnegie Laboratory for several weeks before shipment, the transportation in a small jar was evidently more than it could stand and

it lived only a few days after reaching the Aquarium.

It should be noted that this species is not related to the fresh water goldfishes, but belongs to the family of cardinal fishes (*Cheilodipteridae*) closely related to the perch family. R. C. O.

NEWS ITEMS.

Aquatic Nature Fakes: The pictures on the opposite page are not published with intent to deceive. The lobster does not naturally assume the guise in which he is here shown, and the spider crab does not weave a web. Changes at the Aquarium: Director H. C. Bumpus, of the American Museum of Natural History, is on leave of absence from June 15 to December 15. During this time Director Charles H. Townsend, of the New York Aquarium is Acting Director of the Museum and Professor Raymond C. Osburn of Columbia University has been made Assistant Director of the Aquarium for the same period. Mr. Chapman Grant, B. A., (Williams College, 1910) has been added to the Aquarium staff in the capacity of Scientific Assistant.

Night Opening at the Aquarium: Beginning with September 22 the Aquarium has been open to the public every day continuously from 9 A. M. till 10 P. M. The very considerable attendance at night indicates that a certain portion of the public appreciates the opportunity to visit this institution in the evening.

Aquarium Lights: In order to properly light the Aquarium for opening at night, additional electric lights have been installed on the floor columns and extra gas lights on the gallery. These furnish sufficient light to properly illum-



Photo by R. C. Osburn.

THE MARINE GOLDFISH.



THE SPIDER-CRAB AT HOME.

inate the various exhibits and labels, making the lighting as effective as in the daytime. A cluster of lights has also been placed at the entrance and an electric sign indicates that the building is open to the public.

Breeding of the Octopus: Mr. L. L. Mowbray, curator in charge of the Bernuda Aquarium, informs us that the Octopi in the Bernuda Aquarium have bred during the past summer. The female after laying the eggs, which are in clusters somewhat similar to those of the common squid, remained above them to protect them until they hatched. Even the male Octopus was attacked so savagely that it was necessary to remove him from the tank. Mr. Mowbray has promised us a full account of the breeding habits for a later number of the Bulletin.

Local Tuna Fishing: It may be of interest to our readers to learn that the great or leaping tuna, Thunnus thynnus (Linnaeus) is being taken in considerable numbers in this vicinity. An account in Forest and Stream, October 15, 1910, states that they are taken frequently by the Swedish fishermen at Barnegat, N. J., on hand lines, while fishing for bonita, etc. Specimens weighing all the way from twenty to one hundred and fifty pounds have been taken in this way.

In the same number of Forest and Stream is published a photograph of two tunas, one weighing twenty-five and the other fifty-two pounds, taken with rod and reel on September 30, by Mr. T. E. Townsend of the Asbury Park Fishing Club. More recently Mr. Townsend has taken another specimen weighing twenty-six and one-half pounds, which was sent to the Aquarium to make certain of the identification.

The tuna occurs both in the Atlantic and Pacific, but the only place where it is regularly fished for by anglers is at Santa Catalina, California, where the well-known Tuna Club has been organized.

If the tuna is proved to occur with any regularity on the New Jersey coast it will certainly attract a great many sportsmen in search of this king of angler's fishes.

R. C. O.

YOUNG THREAD-FISH.

N the Bulletin for March, 1910, there was published a brief reference to the thread-fish, Alectis ciliaris (Bloch), together with a photograph of an adult specimen. The species derives both its common and scientific names from the long, lash-like filaments which are present in the young, but which gradually disappear with age. These structures are merely soft filamentous appendages which grow from the tips of the first five or six rays of the dorsal and anal fins. They may be connected for a short distance by membrane or they may be entirely free from each other.

In the Bulletin note referred to, it was stated that the streamers are sometimes twice as



A RE-ARRANGED LOBSTER.



YOUNG THREAD-FISH.
From a lead-pencil drawing by Chas. R. Knight.

long as the fish itself, but the statement was a very modest one. They may be as much as five times as long as the fish, as is shown by the accompanying drawing. The specimen here figured was taken at the U. S. Bureau of Fisheries Station at Woods Hole, during the past summer and was accurately drawn by Mr. Charles R. Knight, well known as a zoological artist. Mr. Knight reports that the filaments in this specimen were longer than in any other specimen ever taken at Woods Hole. A specimen with highly developed filaments was brought into the Aquarium for identification during the present summer.

The thread-fish is distributed around the world in tropical waters and reaches a length of three feet. The young ones find their way along our shores as far as Cape Cod in the summer time, probably carried by the Gulf Stream, but the approach of cold weather kills them all, as they can not endure temperature much below 60 degrees.

BERMUDA FISHES.

METHODS EMPLOYED IN THEIR CAPTURE AND TRANSPORTATION FOR EXHIBITION.

By L. L. MOWBRAY.

Visitors to the Aquarium frequently inquire how our tropical fishes are collected and shipped. Mr. L. L. Mowbray, Curator in charge of the Bermuda Aquarium, has kindly furnished for the readers of the BULLETIN the following account of the methods employed by him in this work.

R. C. O.

THE principal method of capturing bottom fish is by the fish-trap, which is placed in depths of from one to twelve fathoms of water. The trap is constructed of galvanized wire netting, fourteen to sixteen gauge, from one-half to two-inch mesh. It is about four feet six inches long, eighteen inches deep and three to

four feet wide. The entrance is V-shaped, turning down abruptly and forming a funnel. This is placed about nine inches from the bottom of the trap, or at half its depth. The reason for this arrangement is that the fish can swim freely under the entrance or funnel.

On account of theft by poaching fishermen, the collecting traps are set without any buoys or markers of any sort, except that in the case of the deep water ones a submerged buoy is attached to float some twelve or fifteen feet under water so that the line to the trap can be secured. The position of each trap is taken by means of bearings on points on shore taken with the sextant. In this way it is possible to locate the traps with perfect accuracy, even on the outer reef, nine miles from the nearest land. The exact position of a trap or its submerged buov is easily noted by means of a water-glass when the locality is reached by the collecting boat. The very clear atmosphere and water make these methods available at Bermuda to an extent that would not be possible in many other regions.

The trap is baited according to the kind of fish to be captured. For instance,-when setting for angel-fish, (Angelichthys), the bait used is mussel, lobster or any of the larger Crustacea, crushed and placed in the bottom of the trap. The sea-urchin is also excellent bait for this fish, but a great disadvantage in using the sea-urchin is the damage done to the eyes of the fish by coming in contact with the spines when flapping about in the trap. These same varieties of bait are also used for the butterflyfish, (Chaetodon) and surgeon-fish, (Hepatus). The trap for these fish is placed in from one to four fathoms of water on the reefs. By placing it in deeper water, six to eight fathoms, with the same kind of bait, and among the broken

reefs the hog-fish (Lachnolaimus) and the porgy, (Calamus), are captured. The parrots, (Scaridae), are occasionally taken by baiting the trap with mussel, but vegetable bait, such as cactus with the spines removed, banana, and certain algae, is far preferable. The Serranidae and Lutianidae are captured most successfully with white-bait, (Atherina and Stolephorus spp.), mashed and mixed with sand and rolled into large balls. The traps for these fishes must be placed around the edge of the reefs, in from three to eight fathoms of water. Surface fishes, such as bonito and amber-fish are usually caught with a hand line. In fishing for these species a chum of ground whitebait, is made and scattered over the side of the boat. A short, stout hand-line only three or four feet long is used and the fish are landed at once without playing and placed in the live-well of the boat. Souid is the principal and by far the best bait. The seine is used for most of the other Carangidae.

The collecting boat is fitted with a live-well, and as the traps are hauled the fish are placed in this well and taken to the live cars which are six to eight feet long, four feet wide and four feet deep. The frame of these cars is constructed of wood and is covered with wire netting. The fish are then separated according to species, and placed in their respective cars. The Servanidae are kept together except when large, and in this case they are placed in a stronger and larger car where there are no small fish of any description whatever. This family is fed about three times a week on small fish, principally pilchards.

The angels, which are not at all angelic in their dispositions, are by far the most difficult to keep in good condition in captivity, as they are continually fighting. The result is that great numbers of them are blinded by the preopercular spines of their opponents. Their food, in captivity, consists of crushed mussels and sea urchins.

The surgeon-fish, (Hepatus) is also a fighter, especially in the breeding season, and it is a common occurrence to find fish of this genus with ten or a dozen wounds about the body, inflicted by the caudal spine carried by the members of this genus. Their food consists of crushed mussels, polyzoa and algae. Stones having these attached are gathered and placed in the cars.

The parrots must be very carefully watched, as there appears to be always one ruler among

them who, while they try to feed, will dart at and strike the others, and will frequently ram so hard with the heavy jaws that the fish struck will not recover. Their food consists of bivalves and algae attached to stones. The stones usually selected contain the burrowing molluse, (Pholas, etc.) and are covered with the salt water mussel, (Mytilus), and (Arca). It is necessary that the stones be placed in the cars as the parrot must have something hard to crush with its pharyngeal teeth. The species of Morays, (Muraenidae) are separated, and they must be fed regularly, otherwise they become so ferocious that they attack one another. They are fed on small fish of any species.

The Ostracidae, the cow and cuckold fishes, are separated from all other fish, and are never left in the same well as they throw off a slimy, poisonous substance that is fatal to all other fish. One or two left in the well over night will kill the whole catch. Their food consists of soft parts of mussels.

Two days before the fish are separated and the stock selected for shipment, they are fed very lavishly, then they are assorted and placed in one large car with compartments. This car will hold comfortably five to six hundred fish of the size usually shipped. The fish are not fed again before shipment nor en route, making a total of four or five days without food. The reason for this is that they do not properly digest their food during transportation, and anything taken is regurgitated in a short time unchanged.

The large car is taken to the ship, where the fish are hoisted on board in buckets and placed in tanks constructed for the purpose, provided by the New York Aquarium. The ship's pumps for the supply of sea-water are started about four or five hours previous to placing the fish in the tanks, in order to thoroughly cleanse the pump and piping of any deposits or corroded matter that might be injurious to the specimens. The water is forced freely through the tanks until the northern edge of the Gulf Stream is reached. The temperature from Bermuda to the Gulf Stream from early June until September, ranges from 76° to 86° Fahrenheit. When the Gulf Stream is reached the air pump and its connections are overhauled and placed in readiness for use. In crossing early in June, the Gulf Stream will range from 76° to 78°, but at its western border the temperature of the water will drop from 10° to 20° within five minutes. At the slightest sign of a rapid fall, the water is shut off and the air applied instead



ON THE COLLECTING BOAT.

Preparations for breakfast under way.



SETTING THE TRAPS AT THE EDGE OF THE REEF.

Noting its position by means of a water-glass.

Photos by L. L. Mowbray.

for aerating the water, in order to prevent any considerable decrease in temperature.

Angel-fish and parrots will be very inactive at a temperature of 65° and at 60° Fahrenheit will die.

The Serranidae and most of the bottom fish will stand a temperature of 58°, although at this temperature they are not at all active.

Butterfly-fish, squirrel-fish and Spanish hog-fish will stand only about 62° as a lower limit.

The morays can endure a temperature a little below 60° . The trigger-fish, (Ballistes) can go safely to as low a temperature as 44° .

Later in the season, that is, after the middle of July, the water is carried gradually farther north as far as to Scotland Lightship off Sandy Hook, but never north of this point except in case of the air pump being disabled.

The eatch of a season will run from seventyfive to one hundred species.





THE LEAPING BLACK BASS.

The two pictures of the small-mouthed black bass show a fish nineteen inches long, weighing three and one-quarter pounds, on the line. The fish was caught and photographed at Lake Gecebe, Ontario, by Mr. Fred H. Smythe, of the American Museum of Natural History.

C. H. T.

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THE CAPTURE OF "SILVER KING."

By PAUL J. RAINEY.

O many of my friends have asked me how the large polar bears were captured that I brought back from my recent hunting expedition in the arctic regions and presented to the New York Zoological Society, I am tempted to gratify a desire that is perfectly natural.

On Saturday, July 30, at three o'clock in the morning, in one of the small bays of Ellesmereland, about the 77th parallel, we sighted a large bear on the ice, a mile or two ahead. He stood on the very edge of an enormous pan of ice which extended some two miles back to the shore. The lofty mountains of the mainland, furrowed with enormous glaciers, made a beautiful background, and the cold midnight sun, together with the arctic calm, completed a picture that any man would remember to his dying day.

The bear stood with his long neck thrust well forward, trying to get our scent. Probably he never had seen man before. We headed almost straight for him, and when the ship hit the ice a hundred yards to his left, he took to the water like a duck.

One of the most remarkable things about a polar bear is his eleverness in diving from a pan-ice. The most difficult dive for an expert swimmer to make is from something almost at a level with the water. The bear makes a more beautiful dive than I have ever seen made by a human swimmer, and when he glides into the water, he leaves hardly a ripple behind him. They cannot stay under water very long, however, as we found when pursuing them with the launches.



HE STOOD ON THE EDGE OF AN ENORMOUS ICE PAN.



HIS STRUGGLES WERE TERRIFIC.

We quickly decided to take that bear alive. and after cutting him off from the ice we lowered our launch and started in pursuit. Although these bears are able to stay in the water for hours, they are not very fast swimmers; and we very easily overtook our quarry. When we ran close up to him, he turned to fight; and then we threw a rope lasso over his head, took a turn on a cleat and started to tow him to the ship. His struggles were something terrific, and in a moment he had thrown the rope off his neck and was free. Recoiling our rope, we threw it and caught him again, and again he fought his way out of the noose to freedom. This was repeated many times. He rarely stayed in the rope for more than three or four minutes at a time, as the noose would slip over his small head very easily, when we would be compelled to go back and start all over again.

Finally, however, the rope held, and we succeeded in getting the bear to the ship, when our men swung out the large crane or derrick, operated by a powerful steam winch, to hoist him aboard. When we passed the rope to the hands on deck they were compelled to hold the animal very tightly to keep him from climbing into the launch. Presently it seemed to me that the bear was choking, and I ordered the rope loosened at once. Too late! His eves were glassy, and he was stone dead.

This unfortunate experience taught me something, however,

in the art of catching large bears, and I decided to use different tactics the next time.

At the same time, we discovered that the cages bought from an animal dealer

in New York were too small, the dealer evidently thinking we intended to catch cubs, whereas, in reality, we were expecting to capture bears weighing from 900 to 1100 pounds. The first mistake we made was in getting the rope squarely around the neck of the animal, so I decided that the next bear we roped I would leave the

noose slack until we had gotten his forelegs through it, when we could hoist him on board and lower him into the hold

without any danger of choking him.

On Thursday, August 4, we sighted a large bear, that the Eskimos took to be a female, but which proved to be the large male bear now in the Zoological Park, swimming among the small broken pans. We lowered the launch and started after him. We had considerable difficulty in getting close to him, as he would gain on us very rapidly whenever he crossed over a pan which we were compelled to go around. Finally, however, we succeeded in cutting him off by running between him and the pan for which he was making. Just then a very laughable thing happened. Captain Bartlett, who was steering the launch, was sitting on one side, at the wheel. When the bear saw that he was cut off from the pan, he dove, and we thought he would come up at the other side of the boat. This, however, was not in his mind, and he came up directly alongside, and smashed the boat a terrible blow just about a foot under Captain



HE THREW THE ROPE OFF AND WAS FREE.

Bartlett. Bartlett gave one wild jump across the boat, not even taking time to change his sitting position, and landed very neatly on the seat of the other side.

The bear seemed to have an idea of getting into the launch, and we had to punch him away with the boat-hook. Finally we succeeded in roping him, and this time I took good care to leave the rope slack until he had put his forelegs through it, when I took a turn with our end of the rope around a cleat just as the bear was busy climbing out on the ice. In the excitement, we had neglected to reverse the engine, and when he went out on the ice he very nearly took the launch with him. To have a 900 or 1000-pound bear fastened to your launch and dragging you out on the ice, under a full head of steam, is not a very pleasant position to be in. At this time the

bear could very easily have gotten into the launch!

Finally, however, we succeeded in slacking away the rope, got the engine going astern, and gradually started to drag the animal into the water. It was a wonderful sight

to see this enormous brute with a strong rope just behind his fore-shoulders. He would rear on his hind legs, bite at the rope and jump up and down; but the good, old Standard Motor in the launch did not go back on us, and we steadily and surely dragged him towards the edge. Finally, seeing that the inevitable was coming, with a vicious growl he plunged into the water and started for the launch.

We did not have much difficulty in keeping him out, except when we were turning the launch around and getting it going ahead toward the ship, half a mile distant. The way he churned the water, and twisted and surged was really thrilling, but he had left the ice-pans forever.

We signalled the ship to move into open water, as we needed plenty of sea room in which to handle our bear, having had all the experience we wanted in the broken ice.

After we had gotten some 200 or 300 yards away from the pan-ice, the big brute succeeded in getting out of the rope, and I was compelled to rope him again. This time he would not keep his head high enough out of the water to enable me to get the rope over him, so we were compelled to run up close, and hang the noose on

the end of the boat-hook. By dropping the noose over his head and carefully allowing it to stay slack until he had gotten one or both legs through, we at last succeeded in getting him fast once more, and started to the ship, but not, however, before he had made one or two unsuccessful attempts to climb into the launch. The placing of the noose over his head with the boat-hook had its disadvantages, and was rather dangerous, because we were compelled to go very close to the bear.

We towed him to the ship, swung out the crane, fastened the hook onto the rope and, in the twinkling of an eye, Mr. Green, the mate, had hoisted him high into the air and swung him over the ship's deck. This caused a wild stampede among the Eskimos, who were perfectly familiar with the strength and power of

a full-grown male polar bear. Willing hands were at the swinging tackle of the derrick, however, and in another moment we had the roaring, raging monster over the hatch of number one hold. As soon as he had been gently lowered down,



FINALLY THE ROPE HELD.

all hands made a wild rush for the hatch to have a look at our pet.

We found him surprisingly cool, merely sitting on his haunches, growling, and making the champing noise peculiar to bears when angry. The rope was still around him, but no weight being on it the noose was quite loose, and as soon as he moved around it fell off.

The next day, to my surprise, our captive ate small pieces of bread and meat that were thrown down to him. Then the question arose, how shall we get him into the cage? We needed some of the coal under the bear, to keep the ship trimmed. It was a very serious situation, as the fireman did not show any willingness to go down for the coal. At once we set to work to knock our small cages to pieces, and build a larger one, some ten ft. long and six ft. broad and high. We used the iron bars for the door, and the sheet iron for the bottom.

After starving our bear for four or five days, we placed a fine, juicy piece of walrus meat and a tub of fresh water inside the cage, and lowered it down to the bear. He started directly in, but the sailor who was working the trap-door let it drop too soon, and the bear held it up with his back while he backed out.

This episode seemed to make the bear very angry, for he jumped upon the top of the cage, and found that he could just put his head and forepaws over the edge of the hatch and onto the deck!

Again there was a wild stampede of Eskimos, sailors and dogs; for it looked as if he surely would be up on the deck in an instant. In the excitement, Michael, the wheelman, left the wheel, and for a moment everything was in a state bordering on panic.

At this point one of the sailors did a very brave thing. He ran up and struck the bear heavily over the head with a deck mop, whereupon, after giving a savage growl, the animal went back into the hold. It was fortunate that he did so, for had he gone overboard in the heavy sea that was running, it would have been impossible to have stopped and picked him up, and we would have been compelled to shoot him.

Immediately we hoisted the cage out, and waited another 24 hours, when it was again lowered with a good supply of walrus meat and fresh water, as before. This was quite enough for "Silver King" (as we had named him) and in he went. Without taking time to untie the rope that held the trap-door, we cut it; the door fell into place, and our bear was in his cage. Again the steam winch was brought into play, and we soon had both cage and bear hoisted on deck.

As the crowd of Eskimos and sailors collected around in front of the cage, the bear made terrible lunges at them; and every time he lunged at the bars it was impossible for the Eskimos to stand still. They simply had to break and run.

Everything went well until we struck warm weather, and started washing him off with the deck hose every morning. Although he had quieted down, this morning ablution business did not suit him at all, and then it was that he



THE BEAR SEEMED TO HAVE AN IDEA OF GETTING INTO THE LAUNCH.



HE WOULD BITE AT THE ROPE.

made up his mind to get out. The construction of the cage was much too light, and on a dozen different occasions he very nearly succeeded in escaping. It was terrifying to see him grab hold of the smooth side of the cage with his teeth and tear out splinters a foot long. This we finally overcame by nailing a board over each hole, with large spikes through it; but "Silver King" was very clever about biting around those spikes, and never, to my knowledge, did he scratch himself.

One night during a terrible storm the cage broke loose, and, as the water was running free of the decks, it looked as if he was surely going overboard. The alarm was sounded, and the entire crew turned out to help secure the cage. After heaving the ship to and slowing her down a bit, they succeeded in getting on the well-deck, and making the cage fast. Another time, while we were at supper, a sailor put his head in at the door and with a respectful salute said, "Sir, the bear is out!" Someone said, very sensibly, "Please close the door!"

It seemed rather dangerous to go down on the well-deck, as it was a very dark night. However, we got some lanterns, and hurrying down to the cage we found that the bear really had his head and shoulders out. With the aid of a stout boat-hook, we succeeded, however, in driving him back in, and soon had the hole boarded up. After this we always kept a sailor watching the bear, day and night; and I believe we must have driven several thousand nails into the sides of that cage. After our arrival at City Island

I always kept my big 401 Winchester handy in case of an emergency.

After Dr. Hornaday and his men unloaded the bear at City Island, an amusing incident happened. The police captain of the precinct through which they were going to take the bear. got very much worried for fear he would get out, especially after I explained to him that the 32 calibre revolvers his officers were carrying would only serve to get him well stirred up. He asked me if I would loan him a real gun, which I was very willing to do; and after he had called in one of his officers, I gave him a long discourse on how to load and fire a 401 Winchester. A half-hour afterwards, seeing the officer parading up and down the dock with the 101, much to the admiration of several hundred men and boys, I decided to see if he still remembered his instructions. I said to him: "Supposing the bear got out, and you wanted to shoot him, how would you go about it?" Pointing to the safety catch on the side, he said: "I would push the jigger over, and pull the trigger." As I had purposely not placed any cartridges in the barrel, he could not have done any great execution.

I ask indulgence of my readers for this somewhat lengthy article on catching my bear. I am not an author, and probably never will be one, so I hope they will look upon my article with the greatest indulgence.



WE SWUNG HIM OVER THE SHIP'S SIDE.

8-

The CRANE COLLECTION

of the ZOOLOGICAL PARK.

By LEE S. CRANDALL, Acting Curator of Birds.

A MONG the many groups of birds possessing ornate qualities, few are so hardy in captivity, or thrive with such meagre care, as that formed by the cranes. It is true that the ornamental value of these birds is not, as yet, fully recognized in America, although they are kept extensively on European estates; still, large numbers of cranes are brought to this country annually, and there is no doubt that their popularity is steadily increasing.

Captive cranes are, perhaps, of greatest interest when enjoying their liberty on an extensive range; but the aviculturist who is truly interested in them will wish to confine his specimens

where they can be kept under closer observation. For this purpose, a plot of two or three acres of ground should be selected, and enclosed by a fence which need not exceed five feet in height. The Crane Paddock in the Zoological Park is so nearly an ideal home for most of the members of the Society's excellent collection, that a description of it may be of interest.

The paddock is about 150 feet square, and is surrounded by an ornamental fence, averaging four feet in height. While most of the inmates are pinioned, they can leap this fence easily when alarmed, although they never attempt to do so under ordinary circumstances.

so under ordinary circumstances. The enclosure is well carpeted with grass, which is kept closely cropped during the summer months. A number of large shade trees is included within its limits, besides several clumps of shrubs, which afford seclusion to any birds which desire it. One of the most valuable features, however, is a little stream that traverses the entire length of the paddock. The birds derive an infinite amount of pleasure from wading and probing about in the little pools, and the effect produced is certainly most pleasing to onlookers. A small shed is provided for use during severe weather, although it is seldom entered. The Manchurian, whooping, white-necked, sarus and sandhill

cranes are confined here, while the others are divided between the Wild Fowl Enclosure and the Ostrich House.

Few birds require so little attention as the cranes. Their chief food is grain, but occasional mice, frogs, fish or chopped meat are always appreciated and become a necessity during cold weather. Many of the species are perfectly hardy, provided healthy specimens are secured. If acquired in the spring and given an opportunity for becoming acclimated, they will live in the open through the winter, happily and well, requiring only that they receive their food and water regularly. Some protection

from wind should be provided, of course; and it is well to place within the enclosure a small shed, although it is safe to say that the birds will use it rarely, unless driven in.

A surprising assiduity in the search for worms and tender roots is a failing which may become serious, and result, especially after rain, in the uprooting of patches of turf. Generally this can be checked effectively either by confining the birds for a short time following showers, or by covering their favorite feeding grounds with small branches.

their favorite feeding grounds with small branches.

The greatest difficulty in the maintenance of a large collection



LITTLE BROWN CRANE.

of cranes is found in the erratic disposition of the birds. A number may live together for months in perfect harmony; but just as the collector begins to congratulate himself on their good behaviour, one may be found with an eye missing, or with its skull pierced! It really is not safe to associate the larger and smaller species in a permanent group, unless the enclosure be very large, or the number of birds very small. Great care must be taken in introducing strange birds to a flock already well settled. The newcomers are certain to be subjected to a more or less harrowing inspection by the original inmates, who consider them as nothing more than intruders. The strangers will be persistently



WHOOPING CRANE.

driven from pillar to post for some days, and will be fortunate indeed if they escape without some injury. The safest way to establish a crane family is to place all of the intended members in the enclosure at the same time: then none can use the prestige of previous occupancy as an excuse for tyranny. Brought to gether in this

abrupt manner, the birds will soon learn to tolerate each other.

The Order Grufformes includes, besides the true cranes, six groups of remarkable birds, such as the sun-bittern, the kagu and the seriema, which have been assigned to this order in lieu of a better place. Their structures are confusing, and their relationships obscure. The birds with which we are to deal here are divided into nineteen species, which form the Sub-order Grues, and are cosmopolitan, with the exception that none are found in South America. Asia is particularly fortunate in being the home of seven species. Some of these birds are fairly

easy to obtain alive; but most of them are far from common in captivity, and a few are seen rarely, if ever.

At present, nine species, all of which possess characters of interest, are included in the Zoological Park collection. Several of these are members of the genus Grus, which includes the three species of North American cranes.

The Sandhill Crane, (G. mexicana), still is fairly common on the plains of western North America, where there is little cover to shelter skulking enemies. This is the most numerous of our cranes and therefore the best known. It is rather small, as compared with most of its relatives, its length being about forty-six inches; its color is a uniform slaty gray, with the bare skin of the crown reddish. In captivity this crane becomes delightfully tame, and is very

hardy and long-lived. This species nested in the Zoological Park in 1904 and 1905, but the eggs proved infertile on both occasions.

The Little Brown Crane, (G. canadensis), is a very close relative of the sandhill, and is distinguished by its smaller size, and shorter tarsus. It breeds through Arctic America and Siberia, migrating to the western United States and Mexico for the winter. The inaccessibility of its habitat explains its long confusion with the sandhill, and also accounts for its scarcity in captivity. The species is not represented in the collection at present.

The third and rarest of the American Grues is the beautiful whooping crane, (G. americana). It is pure white in general color, but the primaries are black and the bare portions of the head are reddish, bordered posteriorly by a patch of blackish feathers. The secondaries are curved downward and arch gracefully over

the tail. No doubt, the great scarcity of this bird is due, in part, to reckless shooting, but it seems probable that the invasion of settlers into its breeding grounds in the great middle territories of Canada, and the increasing cultivation along its migration route through the Mississippi Valley, are hastening the inevitable extermination of this finest American birds. The numerical condition of a species in the wild state generally bears an exact ratio to the frequency with which it is met in confinement; it is probable that the number of whoopers in captivity could be counted on the fingers of one hand. It is unfortunate that this splendid



ASIATIC WHITE CRANE.

duced to follow the example of the wood duck, which is willing to save itself from extermination by breeding freely in captivity. Most of the wood ducks seen in American collections are birds bred in Europe! But cranes of most species are

crane cannot be in-

bred only on rare occasions and then with great difficul-Continued on page 734



PARADISE CRANE.

ZOOLOGICAL SOCIETY BULLETIN.

FLAVIN R. SANBORN, EDITOR

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ARTHUR ERWIN BROWN.

On October 19, 1910, there passed away, in the Philadelphia Zoological Gardens, Arthur Erwin Brown, Sc. D., zoologist, and pioneer of zoological-garden building in America. The first great vivarium to be developed in America was the Gardens of the Philadelphia Zoological Society, in Fairmount Park. From the birth of that institution in 1876 until 1897, Dr. Brown was its executive head, with the title of Superintendent, and as such he blazed the trail for every American zoological-garden builder who has

wrought since that time. His connection with the Gardens continued until his death.

Quite independently of Dr. Brown's admirable scientific and administrative work in connection with the Philadelphia Academy of Sciences and the Wistar Institute, his work in his original field entitles him to lasting distinction. During the past twenty-five years scores of Americans who have been called upon to develop "zoos," or zoological gardens and parks of larger dimensions, have gone to the Philadelphia Gardens, and sought Dr. Brown's genial, patient and helpful counsel; and it is safe to say that no man ever sought his advice or help in vain. He was recognized as a qualified expert on zoological garden matters, and one of the first important acts of the New York Zoological Society was to secure from him an inspection and report upon the relative merits of Van Cortlandt, Pelham Bay and Crotona Parks as possible sites for New York's proposed vivarium. Had he inspected South Bronx Park, it is reasonably certain that he would have recommended its selection

All Americans who are interested in zoological parks and gardens have benefitted by the life and work of Dr. Brown, and suffer a distinct loss by his death. He was a pioneer in what has become an important field of scientific endeavor, and as such he is entitled to a permanent memorial in enduring bronze or marble. We have already suggested to Philadelphians that a suitable memorial be erected, and have offered a subscription toward its cost.

W. T. H.

OSBORN'S "AGE OF MAMMALS."

About once every ten years there appears from the press a work on animal life that looms up like an obelisk rising from a plain. Professor Henry Fairfield Osborn's "Age of Mammals" is a monument of scientific research, far-reaching knowledge and logical conclusions on a subject as wide as the world, and millions of years old.

It is the privilege of but few men to occupy a position high enough and broad enough to afford a comprehensive view of the mammalian fauna of the world, past and present. Thanks to years of careful preparation, successful exploration and diligent research, the author of the volume now before us was peculiarly fitted for the task which the finished work represents. "The Age of Mammals" is sufficient in itself to justify the existence of the Department of Vertebrate Paleontology in the American Museum, the richest of its kind, anywhere, so far as we are aware. Not only are Professor Osborn's own extensive discoveries and researches here treated in extenso—and for the first time in a single volume—but a host of related facts and discoveries of recent date that have been drifting through space are here brought together in one well-rounded treatise. In clear language, and with a wealth of admirable illustrations, maps, charts and diagrams, the story of the later evolution of the world and its mammalian inhabitants is unrolled before the reader like a vast panorama. The mammals of long ago are linked up with those of the present, until truly "the past rises before us like a dream."

Of living animals, we are accustomed to deal with the migrations of species, from range to range and from state to state; but here the author deals with the migrations of faunas, and not only from continent to continent, but from hemisphere to hemisphere. Perhaps the most interesting item under this head is that treating of the migration of the fauna of Africa into Asia, Europe and America, which Professor Osborn predicted several years before the discovery of its evidences actually occurred.

In any other than a lengthy notice, it is impossible to offer even an outline sketch of this zoological masterpiece. All those who are interested in the general dissemination of zoological facts will find satisfaction in the knowledge that the author's treatment of his subject is so clear and direct that the language of science, as he employs it, is quite within the comprehension of even the laymen who feel a real interest in the mammalian life of the world. To those who herein take up for the first time the mammals of the past, a glossary would have been a welcome addition to the volume; but that can easily be added hereafter.

It is no exaggeration to say that this work is in a class by itself, and beyond compare; and all zoologists, and promoters of zoological knowledge, are to be congratulated upon its appearance at this time.

THE AGE OF MAMMALS in Europe, Asia and North America. By Henry Fairfield Osborn, LLD. Hon.D.Sc., President of the New York Zoological Society. New York. The Macmillan Company. 8 vo. pp. 635; with 220 illustrations and maps. \$4.50 net. W. T. H.

THE BIRDS OF PARADISE.

On October 12, 1910, three Greater Birds of Paradise, (Paradisea apoda), reached New York by the S. S. Minnetonka, consigned to the Zoological Park. All of the birds are in good condition, and consist of one adult male, with the

beautiful flank plumes about one-quarter grown, one male in nearly adult plumage, but minus the plumes, and a young bird which may prove to be a female. The two older birds are most pugnacious, so that it was found necessary to place the trio in three separate but adjoining cages, on the north side of the main hall in the Large Bird-House. Although very nervous at first, the birds have now grown accustomed to their new quarters, and no longer object to the scrutiny of the crowds which come to gaze at them.

These are the first Birds of Paradise we have obtained alive. They were purchased for \$500 from Mr. A. E. Pratt, of London, who brought them from their home in the Aru Islands, about 90 miles off the New Guinea coast.

This is the species most frequently seen on the hats of women, and the traffic in dry skins formed the chief occupation of the Aru natives for years. As the full-plumaged males only were killed, the species held its own fairly well. Of late years, however, the demand having increased inordinately, less discrimination has been shown in killing the birds, so that their numbers have become greatly diminished. Unless absolute protection is soon afforded to all of the Birds of Paradise and their congeners, this wonderful group must soon become reduced to extinction.

The method followed by the native hunters is quite interesting. The birds have a habit of resorting to a "dancing tree," where the males pose in various grotesque positions, calculated to display to the best advantage the remarkable beauties of their plumage, apparently for the admiration of the females. The hunter builds a shelter of leaves in the tree, and there conceals himself at dawn. As the birds come to the tree, they are shot with blunt-headed arrows and fall to the ground in a stunned condition, where they are dispatched by a second native. This method has the two-fold advantage of securing the birds with plumage uninjured and without alarming the other members of the flock.

Each native tribe has its own trees, which it defends fiercely against poaching neighbors. It is a curious fact that dancing-trees that have yielded many skins for several successive years, are sometimes deserted suddenly, and for no apparent reason, although the birds may return later on.

L. S. C.

ANNUAL MEETING.

The Seventeenth Annual Meeting of the Society will be held in the Grand Ball Room of the Hotel Waldorf-Astoria, on Tuesday evening, January 10, 1911, at 8.30 P. M. An interesting entertainment has been provided.

ty, so there seems little to hope for from this source. The Zoological Society is fortunate enough to possess a very fine whooper and it is hoped that he will be blessed with the usual longevity of his race.

The Manchurian Crane, (G. japonensis), is one of the most strikingly handsome of all the group. It is very uncommon in captivity, and now for the first time is represented in the collection. Its general color is white, as in the whooper, but in this case the arched and pointed secondaries are black and the primaries white. A slaty-black band extends down each side of the neck, the two joining on the nape. The bird measures about fifty inches from tip to tip when fully extended. It ranges from eastern Siberia to Corea and Japan: in the last-named island it was formerly held sacred and was allowed to be hawked by the nobles only. The cranes depicted on Japanese screens are usually of this species.

Next in systematic order comes the Asiatic White Crane, (Sarcogeranus leucogeranus). It is considerably smaller than the foregoing, and is found from south-

eastern Europe to China and Japan. It is white, the primaries black, and the head bare and reddish in color. The immature birds of this species, as well as those of the whooper, have the white plumage infused with cinnamon-buff, giving them a remarkable appearance. This is one of those species more easily obtained alive, and is brought to this country in some numbers. It is quite hardy and easily tamable. The specimen in the Zoological Park, however, has a temper so irascible that he cannot be approached with impunity and is no longer allowed the freedom of the large paddock.

Of the larger cranes, the Sarus, (Antigone antigone), an Indian species, is most commonly seen in collections. It is the tallest of the Order, sometimes attaining a length of sixty inches. Its color is a handsome French gray, the over-hanging secondaries closely approaching white; the head and the upper part of the neck are bare and reddish, the gray feathers of the lower neck being bordered above by a band



SANDHILL CRANE.

of white. The sarus is a most vigorous bird and inclined to be dangerous when associated with smaller and weaker species; its height, strength and an uncertain temper make it a companion to be feared.

One of the rarities of the collection is the White-Necked Crane, (Pseudogeranus leucauchen). This is a medium-sized bird, of a beautiful shade of gray, with the throat and the posterior portions of the head and neck white, the gray of the shoulders commencing at a sharp line. The anterior part of the crown is bare and reddish. The long and falcate secondaries, which are very light in color, are curved less abruptly and hence more gracefully than in some other species. It is found in eastern Siberia, Corea and Japan and is very seldom imported alive. In captivity it is quiet and docile, showing a most pleasing absence of the pugnacity so frequent among its congeners.

A crane of unusual and handsome appearance is the Stanley or Paradise, (*Tetrapteryx paradisea*). It is a bird of fair size, ranging throughout the southern portions of Africa, where

it is fairly common. In color it is a uniform slate, becoming practically white on the head, the feathers of which are so lengthened as to give it a strangely swollen effect. The drooping secondaries reach the height of their development and beauty in this species. The Paradise is a very desirable bird for the aviculturist, for both its docility and beauty; it is imported very infrequently.

In captivity, the crane most frequently seen is the dainty Demoiselle, (Anthropoides virgo). It is the smallest of the family, as well as the most widely distributed, since it breeds in southern Europe and central Asia and spends the winters in southern Asia and northern Africa. Its general color is the conventional gray, set off by the elongated black feathers of the breast, those over the eyes being drawn out into lateral tufts of silky white. The demoiselle is brought to the United States each year in scores, for the demand for it is great. Its small size reduces its capacity for mischief, even if its usually even



NESTING CRANE IN THE ZOOLOGICAL PARK.

temper should allow it to fall from grace; its engaging ways excite the admiration of all who have opportunity to observe them. This crane is quite willing to breed in confinement, and has done so in this country on at least two occasions.

The Crowned Crane, (Balearica pavonina), of western Africa, differs from all the others in the possession of an occipital patch of straw-like plumes, from which it derives its name. It is a handsome bird, the blackish slate of its body plumage being contrasted by white wing-coverts and chestnut secondaries. The sides of the head are bare and colored white above and pink below; there are two small, pinkish wattles on the throat. This crane is uncommon in America, very few having been imported. It is long-lived and attractive, and not so determined a root digger as most others; but its temper, among the Society's specimens, at least, is de-

cidedly choleric.



CROWNED CRANE.

All of the cranes nest on the ground, usually in marshes or on open plains, forming their nests of grass and rushes. The eggs are generally whitish or buff in color, double-spotted with yellow or brown blotches, and commonly two in number.

Young cranes are most precocious, being able to run about quite freely soon after hatching. For a short time before the youngsters commence to forage for themselves, their food consists mainly of insects brought to them by the old birds. The parent birds are very devoted to their offspring, caring for them with great solicitude and guarding them valiantly against intruders. If an attempt to breed cranes in captivity is to be made, a large, grassy run should be provided for the exclusive use of the family, as anxiety for the welfare and safety of the chicks is apt to make the parents over zealous in the treat-

ment of the others in the same corral.

An adult crane is a formidable antagonist, not to be despised even by a man. Frequently some members of the collection are so savage that they must be isolated and the keeper must then continually guard himself against attack. The crane stretches his long neck to the uttermost and without hesitation makes frantic thrusts with his powerful beak, so swift and certain that the eye can scarcely follow the movement.

An interesting characteristic of cranes is their habit of indulging at frequent intervals in grotesque dances, which may be performed by an individual, or by a group in graceful unison. The leader starts off leaping and bowing, with broad wings widely expanded; now seizing a leaf or bit of stick, now tossing it aside in capricious disdain. The spirit of the dance is infectious, and instantly the enclosure is a turmoil of leaping, bobbing birds, each striving to outdo

the others in extravagance of gesture and motion.

Most of the species are provided with lusty voices, which they delight to use with great freedom. However, the tones, which are clear and trumpet-like, are far from disagreeable, and detract nothing from the performer's eligibility to a favored place in the list of captives.



DEMOISELLE CRANE.



CONCOURSE LOOKING NORTH.

The NEW ADMINISTRATION BUILDING, $in \ the$ $ZOOLOGICAL \ PARK,$

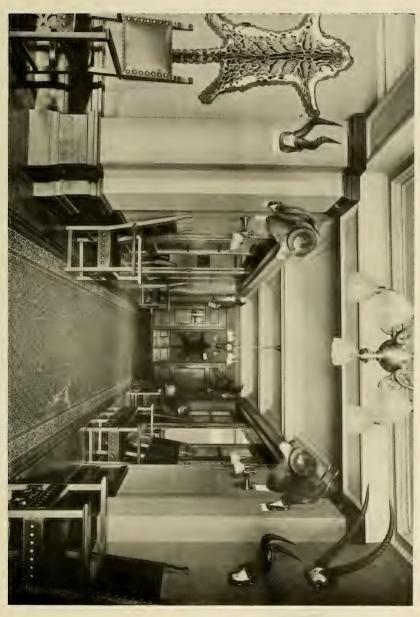
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WITH VIEWS OF THE EXTERIOR AND INTERIOR.



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Aquarium Number
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ZOOLOGICAL SOCIETY BULLETIN

Number 44

Published by the New York Zoological Society

March, 1911

THE FUR-SEAL.

Illustrated with flash-light photographs, made in the N. Y. Aquarium,

NEVER perhaps in the history of natural science, conservation or international politics, has any one species of animal attracted such persistent attention as has the Alaska Fur-Seal. The gradual but rapid diminution in the numbers of this extremely valuable fur-bearing animal is a matter for the greatest regret.

The United States Government has full control of the breeding grounds, and for many years only supernumerary males have been killed under government supervision for their fur. It has been found impossible thus far, however, to put a stop to the slaughter of the females on the high seas. The females, already pregnant, leave their suckling young on shore in the rook-

eries and go long distances to sea in search of food. They are then killed by the pelagic sealers lying in wait for them, and the adult female and a developing embryo are destroyed and the young on shore left to starve.

Only international agreement can prevent this wasteful process, and the United States Bureau of Fisheries, which has recently been given charge of the seal herds, is doing everything possible to prevent any waste on the breeding grounds. The 13,000 young male seals, taken by the government during the past season, were selected from the supernumerary males driven out of the breeding grounds by the successful males. The fact that the United States Governments.



YOUNG FUR-SEAL: MALE.



BALANCING AT THE SURFACE.

ment received an average of \$38.34 for the raw furs of the 1910 catch will serve to indicate what a valuable asset is constituted by the seal herds. The herds are so diminished in size that only a small fraction of the original numbers remains.

Among the interesting features of the natural history of the fur-seal may be mentioned. their extremely gregareous and polygamous habits: the extremesexualdifference in size (the males attaining a weight of 400 to 500 pounds and the



THE HIND FLIPPERS SPREAD IN PRESERVING THE EQUILIBRIUM.

females 80 pounds); the fierce struggles of the males to secure a well-filled harem; the driving out of the unsuccessful males; and the long journevs of the females for food. But the most interesting and wonderful feature of their biology is that of their long migration at sea for a period of some seven or eight months, and the unerring homing instinct that brings them back, after a journey of several thousand miles, to the obscure islets in the Behring Sea where the rookeries are located. The return trip is not even made over the same route as the outgoing journey. On leaving the breeding grounds at the approach of winter, the seals pursue a southerly course until the latitude of California is reached; then they turn rather abruptly eastward until off the California coast where they turn northward and work their way back along the Canadian and Alaskan shores until they arrive at the Pribilof Islands in the Behring Sea.

The adult males reach the breeding grounds early in May, the young males next, and the females, heavy with young, appear just before the young are born in the latter part of June and the first half of July. The young females do not arrive until the last of July or August. The female bears her first pup at the age of three years and only one young is produced each season.

An interesting, because extremely mixed, terminology has come into use about the islands frequented by the seals. The adult male is known as a bull and he wears a wig of longer hair on the back of his neck; young males are known as bachelors; the female is a cow and her offspring a pup, and the society or aggregation is a herd and the breeding grounds are rookeries. The bull collects as many cows as he can secure (from 1 to 100) for his harem, while the unattached males flock together on the hauling grounds. Even the term seal is scarcely appli-

cable, as these animals are but distantly related to the true seals, and sea bear would be much more fitting.

This particular species (Callorhinus a las-canus) occurs on the Pribilof Islands. The Russian herd on the Com-

mander Islands belongs to a slightly different species (*C. ursinus*), while a third species, now nearly extinct, is the *C. curilensis* of Robben and



THEY SPEND MUCH OF THEIR TIME GROOMING THEM-SELVES.



SCRATCHING THE NECK WITH A FRONT FLIPPER.

the Kurile Islands. The southern fur-seals belong to a different genus, Arctocephalus. The most northerly representative of this genus is A. townsendi from the Guadalupe and other small islands of Lower California. Other species are A. philippi of the Galapagos Islands, A. australis of Lobos Islands at the mouth of La Plata River and A. delalandi of South Africa.

In the autumn of 1909 a pair of young pups was brought by the United States Bureau of Fisheries to the small aquarium in Washington where they have thrived. As a result of the success in rearing this pair, six more were brought from St. Paul Island the past November and distributed as follows: one pair to Golden Gate Park, one pair to the Washington Zoological Park and the third pair to the New York Aquarium.

The pair presented to the Aquarium arrived on November 23, and being the first fur-seals ever exhibited in New York City, they have naturally attracted much attention. At the time of their arrival they could not have been more than five months old and their combined weight was forty-three pounds; the male being about three pounds heavier than the female. They were placed in one of the large floor pools where the female proceeded at once to make herself at home, swimming actively about and taking food at the first opportunity. The little male did not appear to be in such good condition, as he swam but little and took no food for a couple of days. In

a few days, however, he seemed to entirely recover and was as active and fed as well as his mate.

For the first week or so both seals spent most of their waking hours scratching themselves, often rolling over and over in the water during this performance, much to the amusement of the spectators. During the first few days the male slept much of the time, floating at the surface with just the tip of his nose out of the water, and many were the solicitous inquiries as to what was the matter with him. Some of our kindhearted visitors even went to the extent of hunting up attendants to inform them that one of the seals was very ill.

Although fresh water is entirely unknown to the seals in nature, except for the rain which falls on them at their breeding grounds, they do not seem to require salt water, but have been given a salt water bath once a week.

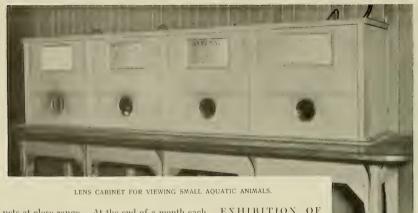
They have been fed twice a day on pieces of fish, cut into strips; cod and herring being used for the purpose. They are entirely without fear of the attendant and will come upon the platform and eat from his hand, though they seem to prefer to take the food in the water. Incidentally, I may mention that the attendant prefers to feed them in the latter way, as they are treacherous animals and bite without any warning. One experience of the ability of their needle-like teeth to pierce flesh and rend clothing was sufficient to convince their guardian that young furseals do not make comfortable



THEY ARE WITHOUT FEAR OF THE ATTENDANT AND WILL EAT FROM HIS HAND.



FRIGHTENED BY THE FLASH-LIGHT.



pets at close range. At the end of a month each of the seals had gained three pounds.

The male died very suddenly on the night of January 22. A post mortem examination made at the American Museum of Natural History, where the skin is to be mounted, revealed kidney disease as the cause of death. His weight, thirty-one pounds, taken at this time, showed that he had gained about seven pounds in the two months of his life at the Aquarium.

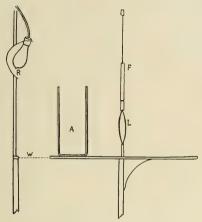
The female, weighed at the end of the second month, showed an increase in weight of six pounds in the same period. At the present time she is apparently in the best of health, consuming her three pounds of fish at a meal in a manner to prove that she possesses a good appetite. Practically the whole day is spent in swimming and it is a delight to the eye to watch the active and graceful movements displayed as she swims about the tank or leaps upon the platform only to take another plunge. Her swimming movements are by far the most graceful of any animal we have ever had on exhibition. The front flippers are used almost entirely in swimming. The stroke begins nearly at right angles with the body and the flippers are carried back along the sides and over the belly until they almost meet. The hind limbs serve for steering and in preserving the balance. Swimming on the back is the usual method, but this position is reversed when coming to the surface to breathe. When resting at the surface the back is uppermost and the hind flippers are spread out to preserve the equilibrium, but when sleeping in the water the hind flippers are more or less doubled forward and the seal reposes on its side with the tip of the nose out of water. R. C. O.

EXHIBITION OF SMALL ANIMALS.

THE average individual possesses a deep and very natural interest, not to say curiosity, in animals of unusual size, either very large or very small. The Zoological Park affords the means of satisfying this curiosity in regard to the larger animals in the living state, while certain of the larger

forms of living fishes may be seen in the Aquarium. The American Museum of Natural History and the Brooklyn Museum supply the desired information in regard to the larger forms by means of preserved material. The museums also have attempted to satisfy the desire for knowledge of the smaller animals by the construction of enlarged models.

It is but rarely, however, that the average person is able to obtain a view of these smaller animals alive, through a microscope or even a lens. For this reason the Aquarium has installed a number of lens exhibits of small animals. For a couple of years a single exhibit of mosquito larvae behind a large reading glass has been in operation and this attracted so much attention that the idea of exhibiting various forms of the smaller invertebrates in the same manner suggested itself. Accordingly, first one, and later four more exhibits were ar-



SECTIONAL VIEW OF THE LENS CABINET.

ranged. The plans for this exhibition cabinet, which are entirely our own, may be of interest and the details are given herewith. A four-compartment case was constructed, each compartment measuring two feet broad by two feet high by one and one-half feet in depth (front to back). In the front of each is a sliding door in which is set a window for the transparent explanatory sign. This door can be lifted to permit the attendant to arrange the specimens in the exhibit. The lens set in the lower stationary part of the front, is a five-inch reading glass with a magnification of about two to three diameters.

A small aquarium jar is placed within the compartment in such a position that the animals in it will be in proper focus. The jar which we have found best suited for our purpose is a straight sided, all-glass aquarium about twelve by twelve by four inches. If the aquarium is too small it will not hold sufficient water to keep the inmates alive and in good condition for very long, while too large a jar will allow free-moving animals to get out of focus readily.

On the back wall of the compartment is placed an electric light with a reflector. This throws the light upon the specimens and at the same time illuminates the transparent information card above. The inside of the compartment is painted white to reflect as much light as possible. Each compartment is lighted separately so that if one is temporarily empty the lens and sign are not illuminated.

The compartments are open above and in the

bottom behind the aquarium jars is a coarse wire screen which permits a free circulation of air behind the jars to prevent them from becoming too highly heated by the lights.

The transparent label is placed high enough above the lens so that while one person is viewing the specimen those behind can read the account of it. The whole cabinet is mounted on legs and set against the wall and so takes up but little space. A shelf a foot wide projects forward below the lenses, serving to prevent people from pressing against the glass.

In this way we have been able to exhibit the following in the short time since the cabinet was completed.

Mosquito larvae and adults; hydroids—Pennaria and Tubularia; sea anemones—Sagartia, etc.; Star Coral, Astrangia; Shrimp, Crangon vulgaris; small jellyfishes, and comb jellies; Bryozoa,—Bugla and Amathia; Horseshoe crab, young; small crustacea,—Gammarus, etc.

R. C. O.

THE OLD MAN OF THE SEA.

THE literature of mythology is full of references to aquatic monsters, usually part human and part fish, and practically all primitive peoples have believed or still believe in some of these marine creatures of the imagination. They have often been worshipped as deities but more often feared as demons or as omens of



THE OLD MAN OF THE SEA.



AS HE MIGHT LOOK IN CIVILIZED DRESS.
Photo by R. Sutcliffe.

storm or plague. Perhaps the earliest known was the fish-headed god Oannes, or Hea, of the ancient Chaldeans, but the Greeks and Romans and various other peoples on down through the Middle Ages believed in tritons, nereids, mermaids, sea-satyrs, etc. Even the early natural history of Aldrovanus, Gesner and others was not free from such suppositious animals which were figured in some of these works.

Africa, the land of so many mysteries, has yielded up the original of another fabulous monster. Anyone familiar with the Arabian Nights will easily recognize from our illustrations "The Old Man of the Sea." It might also be the original of the "Sea Bishop" of Gesner, Sluper and others, but from the fact that this aquatic member of the clergy was "seen off the coast of Poland" and there is no mention of a South African marine diocese.

At any rate the fish head here shown is very interesting. The photographs were made at the Aquarium from the dried head which was brought from Capetown, South Africa, by the owner, Mr. Robert A. Hunt. Except for the evident additions made by the photographer, the specimen was not manipulated in any way. The ragged outline at the back of the head shows where it was severed from the body. The lines on the lower part of the face are natural and are the outlines of the maxillary and other bones of the jaws. The proboseis has shrunk some-

what in drying. In life the resemblance to the human face was even more striking.

We are indebted to Mr. Hunt for the data and for the pleasure of examining the dried head, and some original snap shots taken just after the head was severed from the body.

Literature is not at hand for the identification of the species, but it appears to belong to the family *Sparidae*, and if this is the case it would be related to our sheepshead.

The conical front teeth are shown in the cut. The lateral teeth are very strong and molar-like, evidently for the purpose of crushing shells and, like the famous king of the Cannibal Islands, "he has two rows in his lower jaw." R. C. O.

GREEN MORAY.

A LARGE green moray died on December 30, after living in the Aquarium seven years and six months. When brought from Bermuda by Director Townsend, June 30, 1903, this specimen measured four feet in length. At the time of its death it was six feet long. Mr. De Nyse informs me that during the last two years of its captivity it would take no food voluntarily. It was thus necessary to force food down its throat. The food thus administered would be retained for a while until partially digested, when the remnants would be regurgitated, but no meal was ever disposed of fully or permanently for more than two years.

R. C. O.

AQUARIUM NOTES.

Fish-Hatchery.—During 1910, the United States Bureau of Fisheries presented us with the following spawn for our model hatchery: whitefish 1,500,000; Atlantic salmon 5,000; white perch 1,500,000; shad 800,000. Our collector took 750,000 yellow perch and the Tuxedo Club of New York presented us with 7,000 steelhead trout spawn. These eggs were successfully hatched, with the exception of the white perch eggs which arrived in poor condition, in our troughs and hatchery jars, making an interesting and instructive exhibit from the first of the year till the middle of June. The fry are returned to the Government authorities to be liberated in various waters or are disposed of to clubs, etc.

The disposition of the fry was as follows: quinnat salmon fry to the number of 3,000, were liberated in Lake Roliff, Jenson Kill, New York, on April 21, from the hatching of the previous year and sixty-five silver salmon were given to Mr. Mabie in exchange; on April 27, 20,000 yellow perch were liberated in the 77th Street lake

in Central Park; the white fish were all sent to lakes in Dutchess County, New York, when very small; on May 1, we sent 220,000 yellow perch to the Bronx Park waters and shortly after 50,000 to Prospect Park, Brooklyn; the shad were liberated in the Hudson at Rhinecliffe, with practically no loss; on June 1, we sent 4,000 Atlantic salmon, 5,000 rainbow trout and 4,000 steelhead trout to Millwood. New York.

The difference between the numbers of eggs received and fry liberated is accounted for, partly by loss in the hatcheries; by the exhibits of fry kept at the Aquarium to be reared, and from the fact that we use much of the fry of the com-

moner fish for fish-food.

few days.

West Indian Seals:—We have lost two of the three rare West Indian seals that were added to the collections June 14, 1909. The largest specimen died December 27, 1910, from pneumonia, and a second one died on January 16, 1911, from the same malady, together with a complication of intestinal parasites. The third specimen is still living.

Leatherback Turtle:—Another large leatherback turtle was presented and placed in one of the large floor pools to swim blindly at the sides until exhausted. Unfortunately we are the recipients of one or more of these noble animals each year and always try them in the hope that they may be induced to take food and content themselves with a life of confinement, but they invariably find their way to a museum within a

Sea-Water:—Three loads of sea water were purchased to replenish the loss during the year from our stored supply. This water is transported from outside of Sandy Hook in a tank steamer in order to avoid the polluted harbor water. Evaporation has concentrated our closed circulation water to a density of .0243, whereas the ordinary sea water along our coast is about .022 and that of the dense tropical water around the Bermudas is .028.

Child Welfare Exhibit:—The Aquarium displayed pictures, statistical charts and three balanced aquaria near the exhibits of the other museums of the City at the "New York Child Welfare Exhibit" in the 71st Regiment Armory, from January 18 to February 12. This served to stimulate interest in stocking balanced jars in the public schools, as is attested by the increased demand for live specimens and seawater.

Battery Park:—The Aquarium looks out on Battery Park at a continually diminishing supply of trees. These are dying rapidly and no apparent effort is being made to replenish with

young trees. We fear that a few years more will leave us with a shadeless Park.

Dynamite Explosion:—The explosion of dynamite in Jersey City on the first day of February, which did so much damage and broke windows in the lower end of the City, played some pranks at the Aquarium. The skylights on the side toward the explosion were lifted. when the air pressure was suddenly removed after the first wave of compression had passed, and dropped again a few inches from their true positions, shattering twenty-three of the panes. Many of the fragments fell upon the skylights in the attic, breaking sixteen of the panes which fell to the main floor together with the glass that broke them. Thirteen windows were also broken in various parts of the building. The detonation was heavy, and the simultaneous falling of the glass might well have frightened the visitors, but no great alarm was shown and quiet was quickly restored after the first scramble to avoid the falling glass, which luckily did no damage. Strange to say, none of the heavy aquarium fronts was broken, as occurred during the firing of the heavy guns on the battle ships in the Hudson-Fulton Celebration in 1909. Another strange thing was, that the gas, wherever burning, was extinguished throughout the building.

Publications:—The publications have been moved from the main entrance, where their sale tended to cause a congestion, to the main floor and placed in charge of the telephone operator. Several displays of the publications have been arranged.

Telephones:—A switchboard with extensions to the various departments and offices has been installed. This necessitated cutting through the wall and installing a new door between the main floor and the lower office for the convenience of the operator and those who wish to use the telephone. The wires will enter the building through a conduit via the fireboat dock, thus dispensing with all overhead wires.

Office:—A partition has been erected in the old laboratory to give the Assistant Director a separate office from that of the Clerk. A row of eleven spacious lockers has been built for storage room and the offices freshened with a coat of paint.

Salt-Water Pumps:—A by-pass has been installed in the engine-room for the harbor water system. This makes it possible to bring a reserve pump into use in case of a breakdown of the regular pump. Two pumps are working all the time, one on harbor and one on storage water and the emergency pump can now be connected with either system.

C. G.

ZOOLOGICAL SOCIETY BULLETIN.

FLWIN R. SANBORN, EDITOR.

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Number 44

MARCH, 1911

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SEVENTEENTH ANNUAL MEETING.

The Seventeenth Annual Meeting-in the Grand Ball Room of the Waldorf-Astoria on the evening of January 10, 1911, was the most successful one that the Society has held since its inauguration. Prof. Henry Fairfield Osborn presided and announced the names of the subscribers to the Endowment Fund-a list of whom is printed in this issue. Mr. Madison Grant reported as Chairman of the Executive Committee. The members of the Society were invited to avail themselves of the new Administration Building,

and its advantages were clearly presented to prospective ones. Mr. Grant spoke at considerable length upon the proposed new Aquarium, plans for which the Society is energetically working upon. The business of the evening was concluded by the presentation of a new game protection resolution, which was enthusiastically received and unanimously passed by the Society. Mr. Roy Andrews showed a series of whaling pictures, with an interesting description of modern methods of hunting this large mammal. Mr. C. J. (Buffalo) Jones illustrated with an extensive set of moving pictures, his method of lassoing wild animals in Africa; and a fine series of films of bird life on the islands off the Scottish Coast, completed an interesting entertainment. The Ball Room, which comfortably seats about 1,200 persons, was almost entirely filled. After refreshments were served the meeting ad-ED. journed.

GAME PROTECTION RESOLUTION

Passed by the New York Zoological Society at the Annual Meeting, January 10, 1911.

The following action on game protection was taken at the Annual Meeting of the New York Zoological Society, Tuesday, January 10, 1911. Over 1,000 members and guests were present, and the action was taken with unanimity and enthusiasm.

Whereas, it has been generally asserted in the public press that certain commercial interests in the City of New York will endeavor, at the coming session of the legislature of the State, to repeal Section 98, Chapter 24 of the Laws of the State of New York, restricting the sale of the plumage of wild birds, and Section 241. Chapter 24 relating to the possession and sale of game birds during the close season, and

WHEREAS, the market hunters of Long Island have declared publicly their intention of securing the repeal of Section 170, Chapter 24 of the Laws of the State of New York, prohibiting the spring shooting of wild fowl, and

WHEREAS, the laws as they now stand are barely sufficient for the protection of our wild birds,

Now, THEREFORE, BE IT RESOLVED, that the New York Zoological Society does hereby condemn any attempt to modify the existing statutes in the aforesaid manner, and be it

FURTHER RESOLVED, that the officers of the Zoological Society be instructed to take such steps as may, in their judgment, be most effective to provide for the maintenance of the existing provisions of law for the protection of the birds of this State.

WHEREAS, the widely diversified statutes of the various states of the Union relative to the protection of wild fowl are entirely inadequate for the preservation of game birds, and

WHEREAS, many species of birds in their annual migrations traverse the entire length of the United States, and pass through many distinct jurisdictions wherein the laws vary greatly, with the result that the birds are unduly persecuted, and are drifting rapidly towards the verge of extinction,

Now, Therefore, Be It Resolved, that the New York Zoological Society urge Congress to provide by federal statutes, for the protection of these birds, and be it

FURTHER RESOLVED, that if this course should be found impracticable, that the New York Zoological Society urge the various states in the Union, particularly along the main routes of migratory birds, to unite in uniform laws for the conservation of the wild fowl of America.

MEMBERS NEWLY ELECTED TO FEB. 16, 1911.

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PATRON.
Whitney, Harry

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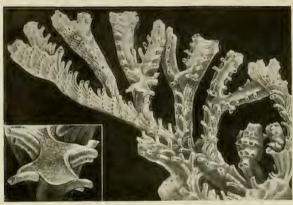
Tomby, Borgfeldt Van Ingen, Mrs. E. H. Williams, William Woerishoffer, Mrs. Anna Zinsser, Jr., August

ENDOWMENT FUND SUBSCRIBERS. January 1, 1911.

Samuel Thorne	\$25,000.00
Jacob H. Schiff	25,000.00
George F. Baker	25,000.00
Cleveland H. Dodge	25,000.00
J. Pierpont Morgan	20,000.00
Est. Phoebe Anna Thorne	10,000,00
Ogden Mills	10,000.00
Levi P. Morton	10,000.00
Percy R. Pyne	10,000.00
Edward S. Harkness	5,000.00
Andrew Carnegie	5,000.00
Miss Emily Trevor	5,000.00
A Friend	5,000.00
Samuel P. Avery	5,000.00
Frank K. Sturgis	5,000.00
John L. Cadwalader	5,000.00
George C. Clark	5,000.00
George W. Perkins	5,000.00
Robert S. Brewster	5,000.00
Henry A. C. Taylor	5,000.00
John D. Archbold	5,000.00
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Lispenard Stewart	
Miss Serena Rhinelander	
Grant B. Schley	
F. Augustus Schermerhorn	
Walter B. James	
Miss Helen Miller Gould	
Miscellaneous, including General	
Fund	1,262.80

\$256,762.80

January 23, 1911.



TUBULIPORA ATLANTICA AND OVICELL, ENLARGED.
From a drawing by Mr. H. J. Shannon.

BRYOZOA OR MOSS-ANIMALS.

THE Bryozoa or moss-animals, so named from the fact that certain of them grow in moss-like clusters, are common members of our marine fauna and yet they are known to but very few persons. They are known also as Polyzoa from the fact that they are colonial in habit. The individuals are minute, rarely as large as the head of a pin and usually much smaller, yet their power of asexual reproduction by budding is so highly developed that they often form considerable masses.

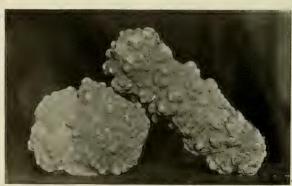
In habit of growth they are extremely varied. Perhaps the commonest method is that of encrusting stones, shells, sea-weed, etc., with a

layer formed of many zooecia or individual animals. They usually remain closely attached to each other so as to form a continuous crust, the walls of which are commonly impregnated with lime, giving great strength and rigidity. Occasionally. however, the walls may be merely horny or even gelatinous, and in a few cases the walls are covered with earthy matter which renders them inconspicuous against the sea bottom. In the case of many of these encrusting species one layer may form upon the top of another, the lower one dving and leaving only its lime skeleton, and this process may go on until a considerable mass is formed, consisting of many dead layers and a superficial living one. Such masses may be merely flat layers or they may form nodules by completely enclosing shells or pebbles, or less commonly, they may rise free from the encrusting base in frill-like, tree-like or cup-like forms, not infrequently of great beauty and symmetry.

In another common method of growth the colony is erect from the beginning. In such species the first individual of the colony (known as the "ancestrula") attaches itself and the sub-

sequent ones are developed from it in such a manner as to form a branching, tree-like colony often very complex. Usually these forms are flexible, either by means of definite joints situated at certain intervals (nodes), or else the whole colony is uniformly flexible by reason of the pliability of the walls of the zooecia or their looseness of articulation.

While all the *Bryozoa* reproduce asexually by budding, they also produce eggs which develop into free-swimming ciliated larvae. These are so different from the adult individuals that they were not at first connected with the *Bryozoa*, but were described separately. The best known of these larval forms is the larva of *Membrani*



SMITTIA NITIDA, AN ENCRUSTING SPECIES. Natural size. Photo by R. C. Osburn.



BUGULA TURRITA, A PLUMOSE SPECIES Natural size. Photo by R. C. Osburn.

pora pilosa, described and known as Cyphonautes.

By means of this free-swimming larva the distribution of the species is obtained as in other sessile animals. The fresh-water Bryozoa, of which there are only a few species, of wide distribution, have asexual winter buds or gemmules, known technically as statoblasts, in addition to the sexual reproduction, but the marine forms do not develop statoblasts. A certain amount of distribution in the case of the marine species is also brought about by means of drifting seaweed and timbers, and species may occasionally be transferred over long distances on the bottoms of vessels. How many species thus transported can maintain themselves in their new surroundings is of course problematical, but probably not many of them survive when carried far out of their normal temperature. For example, the beautiful species, Membranipora tehuelcha, which encrusts the sargassum or gulf weed with a delicate white lace-work, is annually carried into the waters of southern New England, but has never been able to establish itself on our coast.

When the free-swimming larva reaches a certain stage in its development it must become attached. If it happens to settle on mud or shifting sand it is lost, but if it is fortunate enough to come in contact with a pebble or shell, seaweed or submerged wood, or the hard

structure of some other animal, it attaches itself and becomes permanently located. It then undergoes a remarkable transformation or metamorphosis, in which all the organs of the larva degenerate and those of the adult develop. The ancestrula formed by this metamorphosis is more simple in structure than the later individuals of the colony, that is, it is not so highly specialized. It is generally presumed to represent an earlier stage in the evolution of the zooecium and is therefore of interest in tracing phylogeny.

The structure of the individual is fairly simple, but, considering its minute size it is rather complicated. There is a lophophore or

peristome, either circular or horseshoe-shaped. surmounted by a crown of tentacles. These are covered with cilia, by the motion of which, the food, consisting of unicellular organisms, is directed to the mouth in the center of the lophophore. The intestine is a simple U-shaped tube, differentiated into a gullet (in some cases provided with a crushing organ or gizzard), a stomach and an intestine. The vent usually opens outside of the ring of tentacles (group Ectoprocta), but in one small group (Endoprocta), it opens inside of the tentacle ring. The whole lophophore with tentacles, mouth and anus, may be extended through the aperture of the test or body wall, or it may be withdrawn for protection. The nervous system consists of a single ganglion situated between the mouth and anus, but in spite of the apparent simplicity of the apparatus the animals are highly irritable and very rapid in their movements.

Surrounding the intestinal tract is a spacious coclom or body cavity, and outside of this is the body wall. The thin living tissue of the body wall is protected by a chitinous or horny layer which is usually further strengthened by a deposit of lime salts, forming often a remarkably strong, thick shell when fully calcified. This test is usually pitted, cancellated or ribbed in a manner peculiar to the species, and in some forms is perforated by one or more special porcs. In some families a membranous area occupies more or less of the front wall of the

test or cell, but usually the whole of the test is calcified, with the exception of the aperture through which the tentacles are extruded. In the largest group (Chilostomes), the aperture is guarded by a membranous, hinged operculum which is shut down like a trap door when the animal is retracted. In another group (Ctenostomes), a circle of bristles guards the aperture.

For the protection of the colony, a majority of the Chilostomes have developed peculiar organs known as avicularia and vibracula. These structures are really highly modified individuals which have undergone great changes, both functionally and structurally, and have lost by degeneration all the internal organs except the muscles of the operculum, which are greatly hypertrophied. In the case of the avicularium the operculum has become modified into a beak-like organ, and in the vibraculum the process is carried still farther so that the beak becomes a long lash-like organ. These organs are kept in motion snapping or lashing back and forth to prevent other forms from taking up their abode on the surface of the colony. There is good evidence to show the evolution of the avicularium from the ordinary individual. The structure obtained its name from the fact that in certain genera (Bugula, Bicellaria) it is shaped like the head of a bird and mounted on a necklike stalk. This is a highly modified condition, however, and the simplest type is found sessile between other cells of the colony and scarcely distinguishable from them except in the size of the beak. Spines and protuberances are also of frequent occurrence in the Bryozoa and aid in protection.

The presence of sexual reproduction has already been mentioned. The eggs are developed in the spacious body cavity and in some forms are retained there until ready to be liberated as free-swimming larvae. In other cases a special brood-sac or ovicell is formed to harbor the embryos until ready to be released. There are two quite distinct types of ovicell, according to their manner of formation. In the group of Cyclostomes one or more individuals of the colony become especially modified to serve as a broodchamber for the colony. In the Chilostomes, on the other hand, a special organ may be formed by each fertile individual. The eggs migrate into this pouch and undergo their later development there. The ovicells are very characteristic of the different species, and when present they offer one of the best means of identification. The development of broad-chambers serving the same physiological purpose but of different origin affords a splendid example of the power

of functional adaptation in bringing about parallel evolution.

The number of species of these interesting animals to be found in the immediate vicinity of New York City has not been determined. More than eighty species have been taken by the writer within a short distance of Woods Hole, Mass. Probably the number about New York City is considerably less than this, as most of the species require purer sea water than our harbor affords. Several species have been successfully kept in the Aquarium and some of these have attracted considerable attention when exhibited enlarged a few diameters in the lensexhibit aquaria.

R. C. O.

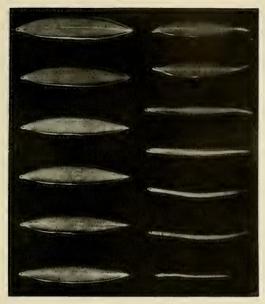
THE FRESHWATER EEL.

THE breeding habits of the eel, until very recent years, have always been a mystery to the naturalist as well as the angler. The ancients believed that eels were generated spontaneously from the mud, while among fishermen the notion is still prevalent, in some places, that eels are the males of catfish. Such superstitions as the above arose naturally in the attempt to explain the absence of eels with spawn in streams or ponds where the species may abound—and of course mud and catfish are abundant everywhere; and although naturalists have known that the eels must breed normally like other fishes, yet how, when and where?

The first step toward clearing up these questions was made by Dr. Theodore Gill's suggestion nearly fifty years ago (1864), that the ribbon-like, pelagic fish known as the Leptocephalus is the larva of the Conger eel. This was later proved to be true (1885), when Delage succeeded in rearing the Conger eel through its metamorphosis from the Leptocephalus.

The metamorphosis of the common European eel, (Anguilla vulgaris), was discovered in 1897, by two Italian zoologists, who proved that the larva known as Leptocephalus brevirostris develops into the elver or young eel of this species. This study was made in the Straits of Messina at the point where Charybdis, the fabulous daughter of Poseidon, was supposed by the ancients to draw ships to their destruction in the depths of a whirlpool. In the currents at this point many abyssal animals are brought to the surface, and among these were obtained the leptocephali of the European eel.

Extensive studies carried on in recent years by Dr. Joh. Schmidt for the Danish government have brought to light the following remarkable facts: (1), the fresh water eel must return to the



METAMORPHOSIS OF THE COMMON EEL.

ocean to breed; (2), the sexual organs cannot mature their products until the eels have returned to the depths of the ocean; (3), the presence of salt water is not alone sufficient, but certain conditions of depth and temperature are necessary, viz., an approximate depth of 1,000 meters and a temperature at that depth of not less than 7° Centigrade; (4), after hatching the young gradually rise toward the surface as leptocephali, having a greatly compressed, ribbon-like form, completely colorless except for the iris of the eve, and having the languid movements characteristic of such pelagic animals; (5), like many other pelagic animals they are negatively heliotropic, and descend to about 100 meters during the day, only rising to the surface at night; (6), after reaching a length of about three inches, the metamorphosis, which lasts a year or more, begins and the leptocephalus is gradually transformed into the young elver or typical eel-like form, and (7), at the close of their metamorphosis the young eels gradually make their way shoreward and in the course of time ascend the streams into fresh water.

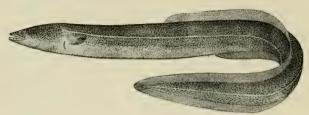
Thus far the eggs of the eel have not been taken nor have the young, up to the time when

they assume their pelagic form of leptocephali, been observed; but from the fact that young leptocephali have been repeatedly dredged from a depth of 1,000 meters or more, it is safe to assume that the spawning and early development take place at this great depth. Such being the case, it is easy to account for the absence of sexually matured eels in fresh or shallow waters. It is not so easy, however, to explain certain other events in the life history, and particularly the remarkable metamorphosis of the eels, involving as it does, the migration to the surface of the ocean. Such a migration must be very gradual to permit of adaptation to changes in pressure, for animals brought suddenly from such a depth are killed before reaching the surface. The migration of the adult eel to its breeding grounds must also be slowly accomplished for similar reasons, and the time thus consumed is sufficient for the development of the sexual products. Dr. Peterson discovered through experiments with marked fish, that the rate of migration is about fifteen kilometers (ap-

promixately eight miles) a day.

The distances that many of the eels must travel in order to reach the breeding grounds are enormous. Not only must they descend from the streams and lakes to the ocean, but in order to reach a sufficient depth they must in nearly all cases make long journeys at sea. Thus, the eels living in the fresh waters of northern Europe find their nearest breeding grounds in the Atlantic, south-west of the Faroe Islands; while those inhabiting the waters of the Mississippi system must migrate out of the Gulf of Mexico to the eastward and northward of the Bermudas, before the proper temperature of not less than 7° Centigrade at the 1000 meter line is reached. Not the least remarkable feature of this life history is the fact, for such it seems to be, that a species capable of withstanding such changes of temperature and pressure and which is distributed from the tropics to the Arctic circle should be so inadaptive in its breeding habits.

The life history of the American eel, (Anguilla chrysypa), has not been so thoroughly investigated as that of its European relative, but the facts so far as known accord well with those determined by Schmidt for the European spe-



FULLY DEVELOPED EEL.

cies. The two species are so similar in nearly every respect that they would naturally be supposed to have the same breeding habits.

The distribution of the eel on both sides of the Atlantic has been carefully studied by Dr. Schmidt. Only one species is known on each side of the Atlantic, and these are apparently kept apart by the greater depths of the middle Atlantic. Not only are the inland waters of both continents penetrated by the eels, but they are also found in the fresh water streams of the oceanic islands, such as the Bermudas and Azores, from the tropics northward to Iceland, even in islands where no other fresh-water fishes exist. The European species occurs from North Cape southward to the coast of Morocco in Africa and throughout the tributaries of the Baltic and Mediterranean Seas. It is not found in the Black Sea nor its tributary streams. Our American species is distributed from Labrador and the southern end of Greenland to Guiana, but is rare along the southern coast of the Caribbean

It will be noticed that the eel reverses the breeding migration of the salmon, shad and other well-known fishes that breed in fresh and shallow waters, while their young return to the ocean for their growth period. Their peculiar habits make it impossible to propagate them by artificial methods or to establish them in other regions of the world where the special conditions of the breeding grounds do not exist. The young eels can be readily transported and will grow well in fresh water anywhere, but attempts to establish the American eel on the Pacific coast, have met with no results beyond the growth of the individuals transported, and the same has been true of the attempt to plant the European eel in the Danube and other tributaries of the Black Sea. R. C. O.

SKATES AND FLOUNDERS.

A STUDY IN ADAPTATION.

TWO groups of our local fishes that are very highly adapted to life on the sea bottom are the flounders and the skates. While these groups are about as widely separated in their relationships as fishes can

be, they have both been able to solve very successfully the problem of adaptation to similar conditions. However, they have been compelled to do this in very different ways, for the skates are relatives of the sharks and have undergone a process of evolution in which the rounded body of the shark has assumed a greatly depressed or flattened form, while the flounder is a bony fish with a body greatly compressed from side to side. Its ancestors swam after the ordinary manner of fishes, but in order to adapt themselves to the bottom were compelled to lie on one side. Any similarities of form or habit between the flounders and skates must therefore be merely cases of resemblances produced in the attempt to suit themselves to the same conditions of life. The changes that have come about in these fishes during this process of adaptation are worthy of our consideration.

The skates or rays (sub-order Batoidei or Rajida), are a modified offshoot of the sharks, (Elasmobranchii), that have assumed a life on the sea floor instead of swimming in its upper waters like their relatives. Their food, for the most part, consists of those animals which are either sessile or move but slowly, and in most cases their teeth are adapted to crushing the shells of molluses and other animals with external skeletons.

When we examine a skate we find a thin disclike body with a broad head, very broad lateral fins, and a long, slender tail, which in some cases is so narrow and long that it forms a whip-like member. Viewed from the under side the head shows a number of peculiarities. As the food is obtained on the bottom the mouth is on the underside of the head so that the food may be obtained without changing the position of the body more than is necessary to bring the mouth over the food. The nostrils also are placed well



COMMON SKATE.

under the head, a position quite unusual in fishes. The gill openings, which in the sharks are laterally situated, are here placed in two divergent rows on the ventral side.

The upper side also shows some unusual features. The eyes are on top of the head, but they occupy about the same position relative to the brain case that they do in the sharks. They are, however, rotated in the sockets so that they look upwards instead of sidewise. The spiracles, which are vestigial gill slits and are either small or wanting in most sharks, are large in the skates and are situated on the top of the head behind the eyes. They have the unusual function of admitting the water to the gills, an act ordinarily performed by the mouth. They are supplied with valves which open and close rhythmically. Professor Rand has shown that a strong current may be ejected through the spiracles, apparently for the purpose of cleansing the gills.

Our common skates lay large eggs encased in horny shells, but many species are viviparous. The embryo is at first elongate like that of the shark, and the gill openings are on the side of the head, but as development proceeds the body becomes flattened and the gill openings move into a ventral position. This of course repeats what has happened in the evolution of the group. Even in the adults there are various degrees of adaptation, and some species, e. g., the saw-fish, show very plainly the relationship to the sharks.

The flounders or flat-fishes (Pleuronectidae) are among the most highly specialized of the bony fishes. As already indicated they once swam in a vertical position like other fishes, but on assuming a bottom habitat they became adapted to lying on one side and to swimming in this position. It is easy to understand how this may have come about, for many fishes which swim in the ordinary position often rest on one side on the bottom. A visit to the Aquarium will demonstrate this fact to anyone who can catch the trigger-fishes, the tautog and certain other species in a siesta.

We have positive evidence of three different categories that this change in the position of the body has really taken place. In the first place, the newly hatched young of the flounder swim in the position normal to other fishes and turn on the side only when they begin to live on the bottom; second, their nearest living relatives, the Zeidae, still swim in the usual fashion, and, third, their probable fossil ancestors (Amphistiidae), were symmetrical fishes which certainly had not become adapted to living on the bottom and swimming on the side.

Some of the species habitually turn on the right side and others on the left, while in still others either the right or left may become the lower side.

Now let us consider the changes which this process of adaptation to bottom life has brought about: the body has been but little modified, but the side upon which the fish habitually lies is more flat than the upper side, enabling it to fit more closely to the bottom. The lower side is colorless, as the pigment has been lost, while the upper side is well provided with pigment for protective coloration. It is interesting to note that this pigment is usually symmetrically distributed over this side just as though it represented right and left sides.*

The most important structural asymmetry is found in the head region, for, while the gills are symmetrically placed on the upper and lower sides and the mouth opens in the normal fashion, the eyes are both situated on the upper side.

^{*}The reader is referred to the article by Dr. F. B. Sumner in the November, 1910, number of the Bulletin.



COMMON SKATE.
Upper side.

In the young fishes, before they descend to the bottom, the eyes are symmetrically placed, one on either side of the head. If they were to remain in this position, one of the eyes would be directed downward against the bottom and would be entirely useless. During the metamorphosis, however, the eye of the lower side shifts its position till it appears on the other side of the head. This is brought about in two different ways, according to the species. In those species in which the dorsal fin does not extend forward on top of the head, the eve shifts around the top of the head till it comes into the final position, but in those species which have the dorsal fin extended upon the head, the eye actually migrates through the tissues of the head between the fin and the frontal bone to get into its functional position. This is one of the most remarkable phenomena in the life history of any fish, but its adaptive significance is unquestionable.

In swimming slowly the dorsal and anal fins, which are developed to such an extent that they nearly surround the body, move in a wave-like motion similar to that of the lateral paired fins of the skate. In more rapid swimming the whole body is undulated as in other fishes, but because of the position of the body the undulations are vertical instead of horizontal.

Many of the flounders have the peculiar habit of burying themselves in the sand with the prom-

inent eyes protruding above the surface. In size, they range from small species a few inches in length to the huge halibuts which attain a length of eight feet and a weight of 500 pounds. The eggs of this group are small and float at the surface, and it has been estimated that the halibut produces 3,500,000 eggs at one time.

R. C. O.

AQUARIUM NOTES.

Contributions:- During the past year the New York Zoological Society has acquired by purchase for exhibition at the Aquarium, 414 specimens of tropical life from the Bermudas, in five shipments, and 192 local fishes from the steamer Angler. The Zoological Society has received in gifts for use at the Aquarium, one pair of Alaska fur-seal pups and 3,820,000 trout and salmon spawn from the United States Bureau of Fisheries, besides 397 specimens from seventy-six private donors. In addition to this we have exchanged for ninety-seven and bought twelve specimens. Eleven seining trips were made to the various parks of the City with the result that 3,303 specimens for exhibition and food were obtained. Our official collector, Mr. John J. DeNyse, collected 505 fish, 4,185 invertebrates and 750,000 spawn for exhibits, besides much material for scientific work. We have had twelve contributors to the library.

SOCIETY BULLETIN

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May, 1911

THE SPECTACLED BEAR.

THERE are two American bear species that are known to science only by their skins, and which never/have been taken alive. They are the glacier bear, (Ursus emmonsi), and the inland white bear, (U. kermodei), the former of Alaska, the latter of British Columbia.

In the Old World, the parti-colored bear of Thibet, (Æluropus), is equally unknown in captivity.

On at least three or four occasions, the Spectacled Bear, (Ursus ornatus), of the Andes has been exhibited in zoological gardens, for brief periods. During the past fifteen years, which

have embraced many tours of the zoological gardens of Europe by American zoologists, we have seen but one specimen, which was in the Amsterdam Garden, in 1903. We have not heard of a specimen having been exhibited in North America prior to the arrival of the one now here.

During the past eleven years our efforts to secure a spectacled bear have been persistent and continuous. Every person bound for South America, and offering to procure for us any animal found in that continent, has been importuned to procure an Ursus ornatus. After years of waiting, and many disappointments, Mr. Edgar Beecher Bronson, author of "In



MALE SPECTACLED BEAR.





HE IS JET BLACK, OF RATHER SLENDER BUILD, WITH LONG, THIN FEET.

Closed Territory," finally procured for us in Quito, Ecuador, a fine specimen of the species so long desired. It was obtained from Don Segundo Espinoza de los Monteros, Governor of the Panoptico, at Quito, and is now about two years old. The long and difficult matter of transportation from Quito to New York, was accomplished through the active co-operation and personal attention of Consul Dietrich, of Guayaquil, Consul Snyder, of Panama, and the officers of the Panama Steamship Company, both afloat and ashore. Frederico arrived at the Park on January 9, in perfect condition.

Frederico, Ursus ornatus, is a jet black bear

of rather slender build with a long, rangy body. very long feet, small ears, placed far apart. semi - circular claws of large size for a small bear, and on his face and throat the strange white markings from which the species takes its name. Instead of the usual complete circle of white surrounding each eye, the circle is broken over the eve, and on the cheek a broad. white band extends downward to the throat where it meets a cross half-collar, two bars of white extend down the throat to the breast, closely parallel. Frederico's height at the shoulder is about 32 inches, and his weight must be about 160 pounds. Having several more years of growth ahead of him, he should attain to double his present weight.

Regarding the life history of *Ursus ornatus*, very little is known, beyond the fact that it inhabits the Andes of Ecuador and Peru. Its dentition is said to resemble in certain features that of the sloth bear of India; but we do not vouch for it.

We exhibit beside *Ursus ornatus* an interesting sub-species, *Ursus ornatus thomasi*, from the Andes of southern Colombia, in which the

facial markings all are wanting, and there is no white feature save a light gray patch under the lower jaw. This specimen is of about the same age as Frederico, but is much smaller. Frederico is very tame, and indulges in several amusing tricks, one of which consists m jumping repeatedly, like a bucking horse.

At present these two bears are shown in the Small-Mammal House, but they will shortly be removed to one of the large bear dens, and quartered together.



W. T. H.



WATER BIRDS ON THE WILD-FOWL POND.

THE ZOOLOGICAL PARK AS A BIRD REFUGE.

THE most important means for preserving avian life, after active protective legislation, is the establishment of reservations where birds may live and nest unmolested, and benefit by the opportunity for numerical recuperation. There are now many of these refuges, established by governments, societies and individuals, and the good accomplished through them is very great.

The readiness with which birds accept proffered protection and food is a saving trait. Almost any tract in which conditions are at all favorable, and in which birds are able to find protection, shelter and a reasonable abundance of food, is appreciated and frequented by the wild flocks. Especially is this true in the case of large cities, for many an exhausted waif drops into the welcome green of a park and avails itself of the chance for reviving its jaded strength.

As a city park, the Zoological Park is not an unusually large area, although it contains 261 acres. It is the fortunate combination of open fields, dense woods, running brooks and sheltered lakes that makes it an ideal bird refuge. Within its limits, during the summer, about forty species of resident birds nest and rear their young in peace and quietude. But it is during the bleak days of winter, when the strangers from the north come to seek shelter, that its value is most apparent. Chickadees, nuthatches, woodpeckers and creepers feed upon the suct



MALLARD DUCKS, WILD-FOWL POND.



AMERICAN WIDGEON, OR BALDPATES: FEMALE.

placed in numerous convenient positions about the Park. Juneos with white-throated song and fox sparrows search the undergrowth for such seeds as may have escaped their vigilant

eyes on previous rounds. Red - polls, goldfinches and siskins frequent the birches and sweet gums, or even join the sparrows in their ground-hunting. It is an unusual winter when a few hermit thrushes, robins and even cathirds, do not spend the season with us. This year a large flock of purple grackles has remained to swell the ranks of the greedy starlings.

Fortunately, these species are no longer in imminent danger of extermination by the hand of man. Their only human enemy is the merciless Italian, who believes that every wild creature, however small, is his rightful prev. Gun licenses and game wardens are the best means for inhibiting this sort of slaughter, and each year fewer cases are brought to light. In this warfare for the protection of the wild birds in the northern end of New York City, the Zoological Society has taken a very active part, and many a fine has resulted therefrom.

It is the protection which the Zoological Park offers to the much harassed wild-fowl that is of the greatest interest and value.

There is much open water in the northern section of New York City. The ponds, rivers and marshes of this section would furnish splendid feeding grounds for migrating ducks-if it were not for incessant persecution by both men and dogs. For this reason, it is seldom, indeed, that wild birds spend much time there. The mallard ducks so often seen flying over the Zoological Park are members of the large flock of semi-domesticated birds that inhabits the Wild-Fowl Pond, opposite the Pheasant Aviary. These birds make daily trips to neighboring waters, and it is not remarkable that stragglers from wild flocks should join them at night, on their return to the home lakes.

Each year, of late, wild wood ducks have spent the fall and winter on the Wild-Fowl Pond. These exquisite birds generally arrive in

August or September, and leave late in April. During the past two winters, four handsome little drakes have contested for the favor of the single captive duck, and one has remained to keep her company throughout the summer.

As might be expected, the most common of

our anserine visitors are the black ducks. The coming of fall always brings a number of these birds, but during the winter of 1910-1911 they have been unusually numerous. A flock of about twenty-five has divided its time between Lake Agassiz and the Wild-Fowl Pond, mingling freely with the few

captive birds on each body of water. These



WILD WOOD DUCKS. Three specimens are shown in the picture,



BLACK DUCKS.



FEEDING TIME, WILD-FOWL POND.

ducks are generally very shy, and rarely become so tame as most others.

Of all our guests this year the most interesting are two female baldpates or American widgeon. These birds appeared on the Wild-Fowl Pond in the fall of 1910, and seem sufficiently contented to make it a permanent home. One has formed an alliance with a male of the closely-related European widgeon, and it would not be surprising if she should forego the vicissitudes of the vernal northward journey.

The tameness of the wood duck and widgeon

is most surprising while they are on the familiar pond and visitors are on their accustomed side of the guard-rail. These wild birds compete for proffered morsels on more than equal terms with the pinioned mallards, their full wings allowing them to move with much greater rapidity than their heavier rivals. But at the slightest attempt at further familiarity they promptly scuttle for the diminutive island, where overhanging bushes hide them from prying eyes.

L. S. C.





WORK OF THE HICKORY BARK BORER.

The picture on the left shows the holes in the bark made by the emerging adult insects; that on the right shows the inner side of the bark with the characteristic vertical tunnels of the female, in which the eggs are deposited in tiny niches, and the lateral larval galleries made in the process of feeding. The insects live on the cambil algor of the tree. Members of the Society owning hickory trees should examine them carefully as the insect is difficult of detection and causes the death of every tree it stacks.



MALE AFRICAN OSTRICH.
Potographed in the Zoological Park in the winter of 1910.

ACCLIMATIZING THE OSTRICH.

T is an interesting fact that a number of birds indigenous to tropical climates are able to endure our severe winters, without apparent discomfort to themselves, and certainly with no ill effect on their constitutions. Several specimens of the Audubon caracara, (Polyborus cheriway), of northern South America and Mexico, have lived for years in the out-door cages of the Large Bird-House of the Zoological Park, and they seem to improve in health and vigor with each season. Practically all of the species of cockatoos and parrakeets so plentiful in Australia are entirely indifferent to cold. An escaped Amazon parrot entered the Zoological Park one fall, and stayed until spring, feeding on what buds and nuts it could find, only to fall a victim to the gun of a misguided marksman.

It is true, also, that those birds which are able to live without artificial heat during cold weather, are much healthier and generally of finer plumage than others that are fully housed. For this, and other reasons, experiments on the endurance of various species in captivity always are of interest and value to the aviculturist. It seems probable that there are many species, ordinarily short-lived and delicate, which would survive much longer if kept at a lower temperature than is customary.

In our climate the ostrich is not a long-lived creature. Many of its troubles can be traced to the effect of draughts, which the birds seem unable to withstand. This difficulty, coupled with the lack of exercise incident to the close confinement of winter quarters, makes that season a very trying one for the bird and its keepers.

In the fall of 1909 it was determined to learn what effect exposure to cold and snow would have on the birds. Accordingly, an unusually vigorous pair of young North African Ostriches, (Struthio camelus), was secured and placed in a large corral at the south end of the Ostrich House.

The first indoor apartment to which the birds had access was enclosed solidly by a wooden casing, a glass front being installed for the benefit of visitors. This permitted leaving open the outside door, without causing a lowering of the general temperature of the house. The floor of the cage was strewn with peat moss, for dryness, and a very low degree of heat was derived from the two warm-water pipes which were included within the apartment.

As fall drew on the birds gradually began to moult. They were remarkably healthy, and really seemed to enjoy the clear, cold weather, often racing madly about the liberal confines of their paddock, and never once refusing their full supply of food. As the days grew colder, early in October it became necessary to confine the other inmates of the Ostrich House, and provide the customary warmth for them. Snow came, and in no small quantities. The winter of 1909-10 was characterized by an unusual number of blizzards and prolonged storms. This inclemency, however, in no way disturbed the serenity of the ostriches; they seemed actually to enjoy the sensation of rolling and kicking in the drifted snow.

It was feared that while the birds might do well enough during the dry weather of midwinter, the cold, sleety rains of late winter and early spring, so dangerous to many birds and mammals, might cause disaster. This, however, was not the case, for no amount of drenching seemed to affect in the slightest degree the sturdy hardihood of the ostriches.

It is an interesting fact that the birds were allowed full liberty during the most severe weather. As stated previously, the shelter cage was very slightly warmed, but the outside door was always open, causing the temperature to remain constantly at a low point.

With the approach of warm, summer weather, the male began to develop the choleric temper for which his race is noted. The female, always gentle and docile, was persecuted so persistently that it was found necessary to remove her to another corral. Thus it came about that



COLONIZING THE PURPLE MARTIN. Several houses—each containing twenty-six compartments—have been placed in different localities in the Park to encourage the martin to breed here. The colonizing of the martin has been successfully accomplished in Plainfield, N. J., where for thirty-five or forty years generations of them have bred in little houses erected on the main street.

with the approach of the winter of 1910-11, the male alone was left in the experimental compartment, the female being warmly housed, according to previous custom.

In some cases, as with toucans which were wintered out of doors in the Zoological Gardens of London, it has been found that birds will endure the cold season with apparent ease, but succumb to the drain on their vitality occasioned by the moult of the following fall. It was not so with the male ostrich. At the end of his second winter in the open, his store of health and vitality, is unimpaired and the quality of his plumage is exceptionally fine.

It is planned to increase the outdoor facilities another year, and presently to extend the scope of experiment to other struthious birds.



PACIFIC WALRUS TUSKS. These tusks are the world's first record for length. Gift of Henry A. Caesar.

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W. I. DENYSE - - - - In Charge of Collections.

THE MUSK-OX IN ALASKA.

During the past twenty years, the absence of proof that the Barren-Ground Musk-Ox. (Ovibos moschatus), has inhabited any portion of North America westward of the Mackenzie River has, perhaps unconsciously, drawn American mammalogists into the belief that the Mackenzie always has formed the extreme western boundary of the genus, at least during the age

This impression was greatly strengthened by Dr. Allen's paper on the White-Fronted Musk-Ox, (O. wardi), published in 1901, in the Bul-LETIN of the American Museum of Natural History. Up to that date, and even down to the present year, so far as we are aware, no evidence has been brought before the public tending to disprove the accepted belief. It is therefore with considerable interest that we have received from a long-time resident of Point Barrow, Alaska, the evidence of living witnesses that during comparatively recent years, herds of musk-ox were found within hunting distance of that settlement.

For twenty-six years Mr. Charles D. Brower has lived at Point Barrow, engaged in trading in furs and ivory, and he has prepared and furnished for publication the statement which appears below. Inasmuch as Mr. Brower is a man of unquestionable reliability, the facts set forth by him may fairly be accepted as establishing a westward extension of the range of the Barren-Ground Musk-Ox along the Arctic mainland coast at least to the longitude of Point

STATEMENT OF CHARLES D. BROWER. "I have lived at or near Point Barrow, Alaska, for twenty-six years. When I first went there (1884), there was still alive an old Eskimo native who had killed musk-oxen with bow and arrow. Although I was then unable to understand the language of the natives, a few years later I was told the story by a man who when he was a small boy had gone hunting with his father and family, and had seen his father kill musk-ox in this section.

The man's name was Mungelo, and he was a native of Cape Smythe village. At the time McGuire wintered at Point Barrow he was two or three years old. (This is given to establish a date.)

A few years after this times were hard at Point Barrow, and no seals were to be had during the winter. The natives were very hungry, many dying from starvation. Mungelo's father packed his sled and went inland to the southeast of the village, about 9 miles, camping on the



YOUNG FEMALE MUSK-OX IN THE ZOOLOGICAL PARK

banks of a small river called Oo-ming-muc, which in the Inuit language, means musk-ox. It is one of the tributaries of the Koog River, which empties into Wainwright Inlet.

Here Mungelo's family hunted all the spring, and killed many musk-oxen, and saved much meat, which Mungelo's father afterward gave to his unfortunate friends who were starving.

In traveling around the northern part of Alaska I have many times seen musk-ox skulls lying about on the tundra, and at times have taken them to my station at Cape Smythe. Only once was I ever fortunate enough to find a skull with the horns attached to it. That was in the summer of 1895. I was on a hunting trip about 100 miles east from Point Barrow, on the shore of a large lake, called by the Eskimos Tashispun, just west of Colville.

There I found a skull with its horns still attached, and in a fairly good state of preservation. The under side of the big bend in the horns was decayed, where they had been resting on the ground. This skull I took home with me, and kept it for over two years, when I gave it to Mr. E. A. McIlheny, who spent the winter of 1897-8 at Cape Smythe, collecting all kinds of natural history specimens.

I have also at the present time a musk-ox skull without horns, at my home at Point Barrow, Alaska. Charles D. Brower.

BIRD PROTECTION.

The following is a report of arrests made, and convictions secured, by our Special Game Wardens, John J. Rose and R. W. Bell, of the Zoological Park force:

October 26, 1910—Fernando Castaldo, for shooting blue jays. Found guilty; released under suspended sentence. By R. W. Bell.

November 10, 1910—Louis Boasi, hunting without a license. Fined \$5. By R. W. Bell.

March 29, 1911—Peter Polten, hunting without a license, and having in possession nine crow blackbirds and five gray squirrels. Fined \$25. By John J. Rose and R. W. Bell.

April 5, 1911—John Whalen, trapping songbirds. Died before trial. By John J. Rose and R. W. Bell.

April 5, 1911—Charles Rohlander, trapping song-birds. Fined \$10. By John J. Rose and R. W. Bell.

April 5, 1911—Henry Whitteborn, trapping song-birds. Fined \$10. By John J. Rose and R. W. Bell.



SUSIE, YOUNG FEMALE CHIMPANZEE, RECENTLY PURCHASED FROM PROF, RICHARD L. GARNER.

THE COLLECTION OF GREAT APES. By Raymond L. Ditmars.

We are now proud to exhibit to our visitors, at the Primate House, a particularly fine collection of great apes. This collection is made up of four chimpanzees and five orang-utans. Several of the specimens have been in the Park for a period of over five years, and even the recently acquired individuals now are thoroughly acclimatized, and seem destined to live long in captivity. As some of the larger apes have passed through the stage where the first teeth have been shed and the second teeth are rapidly appearing, our records as to the development of these creatures, their increase in weight, change of temperament with developing age, and their various maladies, are rapidly becoming more interesting.

From first to last, a number of fine apes has been exhibited in the Zoological Park. The average period of their life in captivity has been about four years, and the death of the majority of them has been caused by tuberculosis. Among our most interesting examples of the past were the chimpanzees Soko and Polly, representing respectively Anthropopithecus schweinfurthi, and A. calvus. The former species may be immediately recognized by the dark skin of the face, which is generously blotched with rusty freckles. Calvus is characterized by the pale skin of the face, a dark H-shaped mark on the forehead and the protruding brows, back of which the hair is quite sparse.

Another well-known ape was Dohong, an orang-utan. All of the three specimens mentioned above lived for periods exceeding five years, and all succumbed to the same malady,—tubercu-

losis. These apes were noted for their exceptional vigor and activity, which undoubtedly accounted for their fairly long lives in captivity. Naturally, the power of resistance against the attacks of pathogenic organisms is far superior in an active animal over one that is inclined to be sluggish.

Usually the indisposition preceding the death of an ape was short. There was a sudden lack of vivacity, and the animal's demise quickly followed. Sadong, Rajah, Brunei, Sultan and Zongo are among the apes that were exhibited for periods of from one to two years. From our care of this number of delicate animals we have derived valuable experience, and the present aggregation of chimpanzees and orangs is in prime condition.

With our present collection of apes it is our intention to make experiments as to their mental capabilities, along a number of lines and with several purposes in view. We find, in the first place, that a continuous cage life, without diversion, is wearing upon these creatures, and that solitude and monotony tends to develop inactivity. Secondly, our visitors display a marked interest in demonstrations of a wild animal's mental capacity. We also realize how much is to be done in solving the problems of habits displayed by mammals of the higher orders. For work along these lines a large room in the Primate House has been fitted with paraphernalia. Here the apes are taught to do many things, and given opportunities to display the mental traits that are utilized in a series of instructive performances to be presented out of doors, on a large platform, during the summer months.



GREAT APES IN THE ZOOLOGICAL PARK.

The entire collection of nine specimens

is shown in the photograph.

All of our apes have been taught to sit at a table, and dine in quite dignified fashion. It takes not more than a week's time to teach an orang or a chimpanzee how to properly manipulate a fork and to handle a cup. The spectacle of a number of apes dining at a round table is instructive in illustrating something more than mere animal training. These creatures are not mechanically driven through this performance. The dinner party proceeds without

cues or orders from the keepers, and the spectator realizes that a considerable amount of memory and reasoning power dominates this exhibition—rather than the dumb obedience of a trained animal that has been driven through its paces for many weeks, or months. Almost needless to say, these exhibitions are immensely popular with the children.

With the coming summer, however, we intend to exhibit to our visitors a far more interesting series of demonstrations than the dinner parties of last year. Three wonderful apes are now on exhibition in the Park. These are Baldy and Susie, chimpanæes, and Mimi, a large orangutan. The writer believes these animals are among the most intelligent apes ever exhibited in captivity. As our experiments with

the individual specimens have been along widely different lines, the possibilities of presenting varied exhibitions are great.

Baldy is an exceptionally vigorous chimpanzee, always mentally alert, and has required little teaching to become a wonderful animal. Without human suggestion he learned the principle of the lever, and has damaged sections of his front by prying the bars apart with his trapeze rod. He thoroughly under-

stands the action of a lock, and can select the proper key for the feed-room closet, from a batch of a dozen or more other keys. When out of his cage he prefers to walk erect. He opens and closes doors, handles various utensils with an apparent knowledge of their use, and will pound on the sides of his cage with emphatic good-fellowship as he recognizes—in the crowd of visitors—any member of the Zoological Park staff with whom he is personally acquainted. Baldy is now about seven years old.

Susie was recently added to the collection. She was purchased from Prof. Richard L. Garner, who obtained her in Africa while on a trip during which he was engaged in the study of the habits of the gorilla and the chimpanzee. Susie was captured about 130 miles inland

from Cape Lopez, West Coast of Africa, about 1° south of the Equator. She was born about the second of January, 1910. Prof. Garner obtained her a month later. She was then too young to walk and was fed upon milk and fruit juices. Her education has been quite different from that of Baldy. From the start her owner sought to teach her how to distinguish geometric forms, such as the cube, cylinder, cone and sphere: also the square, circle and rhomb. He also demonstrated that the great apes are not color blind by arranging movable flaps of such colors as green, vellow, blue and red. Susie learned to lift the different flaps at the word, also to pick out the forms called for. Among her many interesting exhibitions of high intelligence is the ability to pick up objects to the number of one, two or three upon command. If Susie remains in good health she will be a very popular feature of the Park during the coming summer.

Among our observations of the present collection of great apes is one that is particularly worthy of mention while considering the specimens that have been enumerated. Upon arrival, all of our specimens were mere infants, too young to have been taught what to fear in their native wilds. With these very young specimens the writer conducted a series of experiments to ascertain what symptoms of fear, if any, they would display at the sight of creatures that would undoubtedly alarm their parents. In the cage with the babies was placed a very formidable looking (though quite inoffensive) South American iguana-a large lizard with a dorsal crest of red spines. The very young chimpanzees and orangs would approach the strange object with caution. As the lizard moved they hastily retreated, but curiosity conquered and they would finally poke the newcomer, then hastily back away. A closed basket with folding lid and containing a snake was placed in the cage. This always proved of marked interest. The young apes immediately inspected the basket, threw back the lid, stared at the strange apparition within, but were finally curious enough to touch the snake, following its movements with interest; although a certain spirit of caution was evident.

Similar experiments conducted with these same apes, some four years later, were particularly interesting, especially so when we consider the fact that these creatures had none of the lessons of the wilds or the prompting of parental influence. The iguana sent them scurrying up the bars of the cage, but the snake threw them into a state of intense fear. The writer remembers Baldy investigating the snake basket a few months ago. As the unsuspecting ape threw back the cover, he uttered the equivalent to a scream of terror, sprang from the basket, and hurled himself up the bars, whence he climbed to the top of the cage, every hair on his body standing on end. As Baldy looked down at the snake, his lips were drawn back in a snarl of rage, utterly foreign to this goodtempered animal. The other large apes were similarly affected. Instinct is a word too often used in theoretically explaining the actions of really intelligent animals; but in the case of these captive-reared apes, the intense abhorrence noted appears to be an instinctive fear developed by creatures whose parents inhabited a country that is generously supplied with dangerous reptiles, but who themselves never saw a serpent in a jungle.



DOUBLE NORWHAL TUSKS.

Recently acquired for the National Collection of Heads and Horns.



CALIFORNIA ELEPHANT SEALS.

CALIFORNIA ELEPHANT SEALS AT THE NEW YORK AQUARIUM.

By Dr. Raymond C. Osburn, Acting Director, New York Aquarium.

MONG the various marine mammals now verging toward extinction, one of the least known, both to the scientist and to the public at large, is the California Elephant Seal, (Macrorhinus angustirostris Gill). these animals were once distributed in great numbers along the coast of California for nearly 1,000 miles south from San Francisco, they became almost extinct about a half century ago. The large amount of oil-in extreme cases as much as 200 gallons-yielded by these seals, as well as the ease with which they could be pursued and killed, rendered their pursuit attractive, and a considerable sealing industry was carried on in this region during the first half of the last century.

By the year 1860, owing to the scarcity of the seals, the business had gradually been given up,

but it was partially revived again between the years 1880 and 1884. During the winter of 1883-4, Dr. Charles H. Townsend investigated the conditions and secured specimens for the Smithsonian Institution. As far as could be learned about 260 elephant seals were taken from 1880 to 1884. Since that time only occasional individuals have been recorded and the species has been supposed to be extinct.

These facts lend the greatest interest to the capture of six young specimens by the expedition from the American Museum of Natural History and the New York Zoological Society, now working off Lower California under the direction of Dr. Townsend. These specimens were crated separately and shipped by express from San Diego. They arrived at the New York Aquarium on March 13, apparently none the worse for their six days' trip.

As no information in regard to their feeding habits could be obtained from the scanty scientific literature dealing with these animals, they



THE SNOUT IS JUST BEGINNING TO DEVELOP AND CAN BE PROTRUDED ONLY A COUPLE OF INCHES.

were offered a variety of food consisting of numerous kinds of fishes besides crustaceans and squids. For a few days, probably because of their strange environment, they took no food at all, but their appetites gradually returned, and they now require daily six or seven pounds of food apiece. All sorts of fish appear to be acceptable, but they are chiefly fed on smelts, tom cods, roach and pieces of cod. The food is not bolted whole, as is the case with most seals, but is well crushed before being swallowed. After the food is secured the animal usually turns upon its back during the processes of mastication and swallowing. There are no carnassial nor molariform teeth in the molar series, but the small, blunt-conical teeth, separated by rather wide diastemmata or spaces, are sufficient to crush the flesh of the fish and reduce it to a pulpy condition before it is swallowed.

The age of these specimens is uncertain, as the published accounts of the breeding season vary greatly. Captain Seaman states (Proc. Acad. Nat. Sci., Philadelphia, 1869), that on Santa Barbara Island in June, 1853, "we found several cows and their young, the latter only a few days old," but Townsend reports (Proc. U. S. Nat. Mus., 1885, P. 93) that "the young that we met with in 1883-4 were dropped at various times from November 1 to February 1." Accounts agree, however, that the young at birth are about four feet long, and as none of our specimens are over five feet in length they can scarcely be more than a few months old at the most. They show considerable discrepancy in size, ranging in weight, on arrival at the Aquarium, from 167 to 301 pounds. In form they are very stout and clumsy looking, but, notwithstanding this, they are extremely sinuous in



IN THE AQUARIUM POOL THEIR MOVEMENTS APPEAR CLUMSY, BUT THEY ARE POWERFUL SWIMMERS.

their movements, and the body can be bent more than double in any direction, owing to the great flexibility of the spinal column.

The elephant seal takes its name from the fact that the adult male possesses an elongated proboscis which attains a length equal to the remainder of the head. This snout is somewhat protrusible, but when not elongated hangs in a pendulous fashion over the mouth. The female and young do not possess the proboscis. In the young males at the Aquarium it is just beginning to develop and can be protruded only a couple of inches.

The adult male is said to emit a deep roar which can be heard for miles and the females and young males to bellow like bulls. Our young specimens, however, have very high-pitched voices, so that their notes often approach a whistle.

In swimming, the fore flippers which are small, appear to be of little use except in balancing. The hind flippers are used much as a fish uses its tail, and the hinder portion of the body is flexed from side to side. This movement makes their actions appear somewhat clumsy in the small Aquarium pool, especially when contrasted with the extremely graceful movements of the fur seals, which appear to fly through the water by means of the fore flippers. In the sea they must be powerful swimmers, for they are stated by both Scammon and Townsend to frequent only the region of the roughest breakers. On land they crawl with great difficulty and our specimens never make use of the platform in their pool as do all our other species of seals. They are able to mount the platform but it seems to have no attractions for them and they sleep as well as play and eat without leaving the water.

The elephant seals are the largest of all the *Pinnipedia*, the adult males attaining a length of more than twenty feet. There is a marked sexual difference in size, as adult females attain a length of only ten or eleven feet.



THEIR DARK EYES SEEM TO SHINE WITH INTELLIGENCE.

The California species was not described until 1866 (Gill, Proc. Essex Inst. V. 13 and Proc. Chicago Acad. Sci. I, 33), and it is so closely related to the southern elephant seal, (Macrorhinus leonina, Linnaeus), that it is regarded by some as merely a variety. Among the other Pinnipedia the elephant seal is related most nearly to the hooded seal (genus Cystophora).

This is not the first time that the California elephant seal has been kept in captivity. Townsend reports that in the year 1882 six young specimens were taken alive to San Francisco, but he was not able to find out anything further concerning them. On May 20, 1883, five young of

this species were received at the Philadelphia Zoological Gardens, where they lived for a short time, but aside from the fact that they came from Lower California no other data is available. Since that time, however, none appears to have been captured.

In the Aquarium the young elephant seals have from the first shown no indication of fear. They will come to the side of the pool and take food from the hand of their attendant without any hesitation, and do not appear to be treacherous as are the fur-seals and sea-lions. Their large, dark eyes seem fairly to shine with intelligence, and they remind one of overgrown puppies in their gentle behavior, round, sleek bodies and clumsy attempts at play.

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THE ZOOLOGICAL SOCIETY'S PHEASANT EXPEDITION.

By C. WILLIAM BEEBE.

Photographs by the author.

THIS expedition, organized for the purpose of gathering original data for the preparation of a monograph of the pheasants, junglefowl and peafowl, and made possible by the generous gift of Colonel Anthony R. Kuser, has now been completed. The most sanguine expectations were exceeded in the amount of territory covered and the results attained. Voluminous notes have been taken, reinforced

by a great number of photographs and sketches, concerning the habits and ecology of the pheasants found in the countries visited, much of the material being new to science. Although the collecting of living birds was a secondary object of the expedition, several large shipments were sent back. Among these were included the Indian Black-Backed Goose, (Sarcidiornis melanononia). Indian House Crow. (Carrus



HOME OF THE PEAFOWL AND CEYLON JUNGLEFOWL.
Semi-arid region of acacias and euphorbias bordering a salt lagoon, near the coast of south Ceylon.



OUR FIRST PEAHEN.
River ford in southern Ceylon: elephant and sambar deer country.

splendens), hybrid Junglefowl, (Gallus varius + G. gallus; and G. lafayettei + G. gallus), Javan Junglefowl, (Gallus varius), Bornean Fireback Pheasant, (Lophura nobilis). Bornean

Crestless Fireback, (Acomus pyronotus), Crested Wood Partridge, (Rollulus roulroul) and Nicobar Pigeon, (Caloenas nicobarica).

Within the limits of this article I can present only a résume of the work of the expedition. Before we left New York we decided tentatively to include in the monographic work, twenty-two genera of birds. Success attended our efforts to such an extent that we were able to find and study every one of these groups. In the present article I shall deal only with our discovery of these two and twenty genera.

Mrs. Beebe and the writer left New York for London

on December 26, 1909, and were joined at Port Said by the artist Mr. Horsfall, who remained with the expedition for the ensuing six months.

The first field work of the expedition was undertaken in Cevlon, where six weeks were spent. At Colombo we were most hospitably entertained by Dr. Willey, well known in American scientific circles. He aided our search in every way and is responsible for much of our success in this island. From Colombo we made two trips, one to Kandy and the central mountainous portion of the island, and the second to the Yala Game Sanctu-

aries on the extreme southern coast.

The Peafowl, (Pavo), Ceylon Junglefowl, (Gallus) and Spurfowl, (Galliperdix) were thoroughly studied by means of series of skins,



HAUNT OF THE BLOOD AND IMPEYAN PHEASANTS.
Treeless zone of the eastern Himalayas, looking toward Kinchinjunga.



DAK BUNGALOW ON THE NEPAL—SIKKIM FRONTIER.

Our Tibetan women coolies preparing for the day's march. Elevation 10,000 feet.

did collection of Phasian-idae in the Indian Museum. A week after arrival we left Calcutta for the eastern Himalayas, outfitting at Darjeeling on the northern border of India. With thirty-two Tibetan men and women coolies we left this last outpost of civilization and on small Tibetan ponies, made our way northward over difficult trails and through the most magnificent scenery in the world.

With Everest and Kinchinjunga in full view we pushed on higher and higher until we passed through every zone up to the very snows.

Locating the pheasants proved to be exceedingly

difficult, and obtaining them was still harder, especially at the higher altitudes where the scarcity of oxygen made all exertion fatiguing.

photographs of nests, eggs and general environment, and exhaustive notes on plumages, habits, general ecology and hybridization.

Through this most interesting country we travelled by bullock cart, with Singhalese servants and guides.

In the semi-arid coastal region we found wild life extremely abundant. Within ten days I noted ninety-five species of birds, one quarter of the entire avifauna of Ceylon, while wild buffalo. boars, elephants axis and sambar deer and wanderoo monkeys were present in numbers.

Sailing northward to Calcutta we were the guests of Dr. Annandale, Superintendent of the Indian Museum, and through his courtesy I was permitted to study thoroughly the splen-



PAINTING AND PHOTOGRAPHING HIMALAYAN PHEASANT COUNTRY.
Mid April, elevation 12,000 feet. Tibetan Mountains in the distance.

From the trail which bounds Nepal, Sikkim and Tibet, we made many long side trips before we were successful. However, we persevered and ultimately found and studied, at various altitudes, all the groups of eastern Himalayan pheasants.

Beginning with the elevation of Darjeeling and on up to nine thousand feet we found the oak zone inhabited by the Black-Backed Kalij Pheasants, (Gennaeus); the next two thousand feet, characterized by the paper lilae shrubs and lofty rhododendron trees in

full bloom, was the home of the Satyra Trago-

pans, (Tragopan); then from eleven to twelve thousand feet came grand forests of pines,



AT PONGATAUNG ON THE NORTHERN BURMA—YUNNAN FRONTIER.

Our Malay boy and a Kachin hunter with a hen oheasant.

where the Impeyan Pheasants, (Lophophorus), dwelt, although these sturdy birds were often found thousands of feet higher in the treeless zone where the Blood Pheasant, (Ithagenes)—hardiest of all,—makes its home among the bare boulders and the summer snows.

Returning to Calcutta

Returning to Calcutta about May first, we left the city two days later for the far north-western Himalayas. Here, as everywhere in British possessions, through the courtesy of the government officials we were enabled to outfit quickly and with mountain horses and

wild native hillmen as carriers, we made our way through Garhwal into Kashmir close to the Tibetan border. Here we were fortunate in ob-



THREE CHIEFS OF THE HEAD-HUNTING SEA-DYAKS, CENTRAL BORNEO.



DEODARS AND SPRUCES OF GARHWAL; WESTERN HIMALAYAS.

The heights are the home of the Cheer Pheasant; the lower forests the haunt of the Koklass.

taining most interesting notes on the lives of the pheasants of this wild country. Among forests of magnificent deodars, spruces and firs we studied the Cheer, (Catreus), the Koklass, (Pucrasia), and the other western Himalayan pheasants.

On our way back we spent a short time in the plains of India, although it was the hot season. In the parched nullas and even in the open, almost barren plains, the Peafowl and Red Junglefowl were found. Everywhere in India and later in Burma, the abundance and fearlessness of numerous forms of bird life was very striking. This is apparently due to the allpervading religion of the natives which forbids the taking of life, thus doing away with the need of game laws. At the frontier and beyond these countries, where the most interesting forms of pheasants are found, such beneficial influence unfortunately does not extend.

The rains having started, and Assam and Burma thus rendered inaccessible, we steamed from Calcutta seventeen hundred miles south to Singapore. Here we established a second center of operations, making a series of radiating trips, east to Borneo, west to the islands off Sumatra, south to Java and north to the Malay States.

In Sarawak, Borneo, we lived for weeks with the head-hunting Dyaks, travelling in a seventy-foot canoe far up into the interior, almost to the Dutch border, this trip proving in many respects one of the wildest and most interesting of our explorations. The forests of the country in general were disappointing, vast areas having been burned by the Dyaks in former years, and the second growth had never reached real tropical luxuriance even in the low lying alluvial zone. But the intensely interesting fauna-both mammalian and avian-was unsurpassed by that of any other eastern land visited by us. We had under observation close to our camps such mammals as Nasalis, Hylobates, Galeopithecus, Pteropus, Gymnura, Tupaia, Hemigalea, Arctictis, Paradoxurus, Helarctos, Sus, Tragulus and Cynogale, and ob-



HOME OF THE GREAT ARGUS AND PEACOCK PHEASANTS.

Our house-boat on an eastern tributary of the Pahang River in the leech infested jungle of the central Malay Peninsula.

tained photographs and specimens of many of them

Although we could at first obtain no reliable information regarding pheasants, success again was with us and we were able to secure an abundance of data at first hand concerning the Crested, (Lophura), and the Crestless, (Acomus), Firebacks; the wonderful Bornean Argus, (Argusianus), and, rarest of all, the White-Tailed Wattled Pheasant, (Lobiophasis). We found and photographed the dancing place of the great Argus, and of both this and the White-Tailed bird we obtained living and dead specimens. A second trip later on gave us still more data regarding both.

In Java we traversed the entire island and then went to Madura and to Billiton off the coast of Sumatra. By steamer, raft, sampan, and automobile we pursued all rumors of the Java Peafowl and Junglefowl and found both species. Study of the artificial native hybridization of the latter, revealed a multitude of interesting facts,

Our next trip from Singapore took us northward to Kuala Lumpur in the Malay Peninsula. We followed a trail up to the very crest of the main mountain range where great treeferns run riot, and from here on to Kuala Lipis, making numerous stops and side trips. Then, with a crew of five Malays and a Chinaman we started on a long cruise in a government houseboat down the Pahang River and up its unexplored tributaries. The luxuriant vegetation and abundant life was of extreme interest, but the work of finding and studying the pheasants was laborious in the extreme. This was due to the density and thorniness of the undergrowth combined with the presence of myriads of land leeches, scores of which feasted on our blood whenever we left the boat.

Having found all the pheasant groups of this region, we stopped our downward journey when we reached a zone near the eastern coast which was being ravaged by cholera. Here we made our way through the jungle for miles, at last reaching the newly laid tracks of the trans-



JUNGLE INHABITED BY THE BORNEAN ARGUS AND WHITE-TAILED WATTLED PHEASANT.

Our Dyak canne camp on the Mujong River in central Borneo.

peninsula railway. By hand-car and engine we made our way southward to the regular train terminal, and thence by rail to Johore. On this and two other shorter trips in the Malay States, we added three more genera to our photographic list and note books; the Peacock Pheasants, (Polyplectrum); the Bronzed Peacock Pheasants, (Chalcurus), and even the very rare Crested Argus, (Rheinardius), whose dancing arena we discovered in the midst of the almost impenetrable jungle.

This completed our work in the equatorial region, and in late October, 1910, we took the steamer north to Rangoon. In Burma we proceeded by stages to Myitkyina, seven hundred miles farther to the north, and close to the Tibetan and Yunnan borders. Here we outfitted with a pack-train of mules, riding horses, and a motley crew of seven nationalities, and trekked north-eastward, through a wilderness of mountain ranges to the eight thousand foot Sansi Gorge and on into Yunnanese China. Then followed other trips out among the Shans and Kachins as far as we dared go in the then

turbulent state of the country. In spite of occasional disconcerting incidents such as pot shots with poisoned arrows and rocks rolled down by irresponsible natives we had our usual good luck in locating the pheasants and obtained some of the most interesting specimens of the entire trip. New to us were the Barred-Back Pheasants, (Calophasis), the Amherst and Golden, (Chrysolophus), the Fireback, (Diardigallus), and especially the Frizzled Impeyan, (Chalcophasis). The nettle-like bamboos made tracking anything but easy work, and systematic beating of much of the country was impossible. In Burma proper, the status of the group of Silver Pheasants, (Gennaeus), offered many problems of extreme interest.

We returned finally to Singapore where we repacked and shipped our many cases of specimens. On December 31, 1910, we left Singapore for the last time, en route for Shanghai.

In Eastern China our plans were continually upset by unforseen events such as sudden riots, terrific snow and wind storms, and the prevalence of the plague; and added to this were the



DANCING GROUND OF THE BORNEAN ARGUS PHEASANT.

Heart of the jungle in central Borneo.

enormous distances we were compelled to cover and the omnipresence of the hordes of Mongolians. But by constantly re-adapting our plans to the new conditions we were able at last to reach the objects of our search; whether by steamer and sampan, as in the valley of the Yangtze; by house-boat, as in the region back of Foochow; or by palanquin and camel on the bleak deserts of Mongolia. We found many forms of the true Pheasants, (Phasianus), the Reeves, (Syrmaticus), and great was our rejoicing when we were able to obtain notes on the last group of our search, the Eared Pheasants, (Crossoptilum). We succeeded in this only after a long period of impatient waiting for a decrease in the plague. Fortune again favored us and we took the chance of a dash through the infected districts and achieved our goal.

Our last work in the field was in Japan where the birds were comparatively accessible and where their study was fraught with no element of danger—a welcome condition after our Yunnanese and Chinese experiences. The cause of the fearlessness of the birds here was rather remarkable. The Imperial Preserves are also the training grounds for the Japanese troops, so one could easily approach a crowing pheasant with the noise of one's advance adequately muffled by the roar of a sham battle going on in the surrounding plain!

the surrounding plain!

We reached New York, completing the circuit of the globe, on May 27, 1911. Altogether, Mrs. Beebe and myself spent seventeen months in this search for pheasants, visiting twenty countries and travelling approximately fifty-two thousand miles.

Aside from the actual pheasant work of the trip, a considerable number of rare mammals were photographed and collected, and over a thousand species of birds were observed and notes made on their habits. Several hundred of the more interesting birds, and about four thousand insects were preserved.

During our absence from the larger centers of civilization, tremendous advances had been made in air-ships and in all other phases of recent human development, but evolution in the field of Nature as we observed it, was only destructive—a rapid retrogression often discernable from month to month. We could hardly



HAUNT OF THE SILVER, ELLIOT AND OTHER PHEASANTS.

Our Chinese house-boat on the Yung Fu River, Fo-kien Province, south-eastern China.

repeat this trip and obtain all the species of birds which we were able to secure. The causes are numerous and I shall treat of them in detail in a future article. Among others may be mentioned the rapid settling of surrounding countries and islands by migrating hosts of Chinese; the burning of thousands of acres of jungle for rubber culture; the undiminished export of pheasants in many places for millinery purposes; the systematic trapping year in and year out of birds by native shepherds, and the comparatively recent establishment of huge cold storage plants in the very heart of Asia for the purpose of sending thousands of pheasants to Europe. Within a very few years, many of the species of pheasants will have vanished utterly from the face of the earth.

BIRD PROTECTION IN AUSTRALIA.

From "Canary and Cage-Bird Life."

"With reference to our notes of May 5 on the feather trade, it is interesting to see that, according to *The Standard* of May 6, the Australian Commonwealth Minister of Customs has

caused a proclamation to be issued prohibiting the exportation of the birds mentioned in a schedule, and the plumage, skins, and eggs (or eggshells) of such birds, unless it is proved that they are being exported for educational or scientific purposes. The schedule is as follows: Emus, Terns, and Gulls, Egrets, Herons, and Bitterns, Lorikeets, Cockatoos, Parrots, Dollar or Roller Birds, Kingfishers, Bee-eaters, Cuckoos, Lyre Birds, Pittas, Robins, Ground Thrushes and Chats, Wrens, Tits, Thick-heads, and Shrike, Sun Birds, Bower Birds, Rifle Birds, Grebes, Albatrosses, Finches, Orocles, and Shining Starlings. A second proclamation places a like prohibition upon the importation of the plumage and skins of Kingfishers, the Macaws, and Parrot of the green variety, the Stork tribe, the Heron tribe, the Ibises and Spoonbills, the Todies, the Cock of the Rock, the Quexal or Resplendent Trogon, the Birds of Paradise, the Humming Birds, the Monal, any one of several species of Asiatic Pheasants of the genus Lophophorus, as the Impeyan Pheasant; any one of several species of Asiatic Pheasants of the genus Argusianus, as the Argus Pheasant; the Crowned Pigeon; any of the several species of large crested pigeons of the genus Goura, inhabiting New Guinea and adjacent islands, the Rheas, and the Owls."

ZOOLOGICAL SOCIETY BULLETIN.

ELWIN R. SANBORN, Editor

Benartmenta:

Mammal W. T. HORNADAY. Aquarium RAYMOND C. OSBURN, PH. D.

C. H. TOWNSEND.

Reptile RAYMOND L. DITMARS. Bird C. WILLIAM BEEBE. LEE S. CRANDALL.

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BAYNE-BLAUVELT BILL.

NEW YORK PROHIBITS THE SALE OF WILD GAME.

One of the most notable achievements of this session of the Legislature has been the passage of the Bayne-Blauvelt Bill for the prohibiting of the sale of wild game. This measure marks the most important step in the movement for the protection and conservation of wild life on this continent. Game laws are never popular, and it is a source of constant wonder to those who realize the fierce independence of the average American citizen, to realize how he has, more or less quietly, acquiesced in certain restrictive measures. Each step in the campaign has been marked by protests and sometimes by set-backs, but it will be a surprise to all lovers of nature to realize that the destruction of the wild life has now gone so far, that the prohibition of public sale has become imperative.

In the past, the citizen was at liberty to enter into state forests and cut such timber as he liked for sale or for his own use; so up to this date it has been one of the privileges of the hunter and trapper to kill and catch as many birds and fur bearing animals as he could, and to sell them for his own individual profit. This could be permitted so long as the hunters were few and the game abundant. That time passed away in the middle of the last century.

First, skin hunting for deer was prohibited: next, close seasons were provided; then followed limitation of the bag and shorter open seasons; then the entire prohibition of the killing of certain kinds of game threatened with extinction; then came limitations on the mode of killing, such as hounding, water hunting, jacking, the use of snares and swivel guns and the like. All these measures, excellent as they were, checked the slaughter, but the game continued to decrease.

During the last few years it became evident that further restrictions were necessary if we were to have left in this state, enough animals and birds to breed any further supply whatever. The price of game, especially ducks and grouse. rose to prohibitive prices, and when the restaurants in New York charged from \$3.00 to \$5.00 apiece for grouse, it was evident that the end was close at hand.

The Director of the Zoological Park, Dr. Hornaday, was one of the first to realize that a new principle of game protection must be inaugurated in this state, and with the assistance of a number of very energetic workers, and the endorsement of practically every organization in the state interested in the subject of the protection of wild life, he caused to be prepared

and introduced the bill now known as the Bayne-Blauvelt Bill. This bill passed through a long and tedious struggle, being attacked with special bitterness by the game dealers. The proposed prohibition of the sale of game made it necessary to provide for breeding in order to supply game, artificially reared, to take the place of the wild game. This required long and frequent conferences with various individuals and organizations who proposed to undertake in the state the breeding of game. This co-operation was cordially welcomed and the provisions recommended by them were incorporated in the bill.

At the last minute, during the closing days of the session, the game dealers succeeded in having the bill amended to include provisions authorizing the importation of certain species of foreign deer and game birds. These provisions are objectionable in that they may afford a loophole through which the game laws of this and other states may be violated, as past experience with similar legislation has repeatedly shown. It also reduces the value of the privilege of rearing game. It, therefore, becomes the duty of those who are interested in breeding game for the market, to see that the law is strictly enforced.

It will probably be necessary in the near future to amend the bill prohibiting the importation of many of the foreign game birds named in the bill, as otherwise the competition of imported game will make it impossible to breed game here at a profit.

The bill passed the Senate by a vote of 38 to 1, and in the Assembly the vote was unanimous. The New York Zoological Society entered actively into the campaign. It subscribed \$500 to the expenses, and sent the Chairman of the Executive Committee to Albany to appear on behalf of the Society, along with the representatives of other organizations, in support of the bill.

The new law provides for the repeal of all provisions of the existing law authorizing the sale of native wild game, mammals and birds, taken either within or without the state of New York. The only exception relates to hares and rabbits, which have grown so numerous as to constitute a pest in certain sections. It amply provides for licensed game preserves, and the breeding therein of certain species of mammals and birds for the market. The species which may be bred in fenced preserves are White-tailed Deer, Elk, all species of Pheasants, Mallard and Black Ducks. A state license of \$25 is required for any game preserve the owner of which desires to sell his game. The animals in

such game preserves may be killed, otherwise than by shooting, between October 10 and January 10, in the presence of a game protector or justice of the peace, who shall affix to each bird or animal a tag, which must remain in place until such bird or animal is consumed. Game reared and killed in this manner may be sold between October 1 and March 1.

The bill allows the importation of the carcasses of European Red Deer, Roebuck and Fallow Deer, and unplucked Pheasants of all species, Scotch Grouse, European Black Game, Black Plover, Red-Legged Partridge, and Egyptian Quail. These animals and birds must be tagged in the same manner as preserve-bred game, immediately upon their arrivals at the port of New York.

The provision for the sale of European Deer was inserted by the sponsors of the bill, but the game dealers were responsible for the inclusion of the birds above mentioned.

This bill, while not at all revolutionary in its character, nevertheless introduces, as above stated, an entirely new principle; and it is hoped that with the stoppage of the public sale of wild game, the existing stock may be allowed sufficient rest to recuperate in numbers, and ultimately restock many of the portions of the state now entirely without game. There are vast areas of the state where, for instance our native grouse and quail may spread and become as numerous as in early days, and it is probable that this bill will actually lead to the condition of affairs where the number of grouse killed by sportsmen will be greatly increased annually. Experience has shown us that it is not the sportsman, but the dealer in wild game, that destroys wild life.

If this measure proves to be insufficient to protect some of the species now threatened with extermination, the next step in the protection of game will be the total prohibition of killing of such birds or animals for at least a long period of time. Extreme measures are necessary unless we wish our woods, meadows and the fields to be entirely devoid of wild life.

Madison Grant.



SAILORS FROM THE ALBATROSS SEINING SHARKS AT SAN BARTOLOME BAY.
Photograph by C. H. Townsend.

ZOOLOGICAL RESULTS OF THE ALBATROSS VOYAGE.

By CHARLES H. TOWNSEND.
(In Charge of the Expedition.)

BY a special arrangement with the United States Bureau of Fisheries, the New York Zoological Society was enabled to cooperate in the recent voyage of the Fisheries Steamship Albatross to Lower California.

One of the important results of the expedition from the viewpoint of the Zoological Society was the capture of six young elephant seals for the New York Aquarium. The members of the Society will doubtless be interested in hearing not only how these animals were ob-

tained at Guadalupe Island, but in an account of what was accomplished elsewhere during the cruise. As the elephant seal was supposed to be extinct, its re-discovery is a matter of great zoological interest. In addition to the young animals brought back alive, four specimens of the large adult seals (three males and a female) were prepared for the American Museum of Natural History.

The males—carefully measured before skinning—were each nearly sixteen feet long. More than fifty photographs were taken of the animals as they were found on the island. Those published herewith will serve to show the great size, the remarkable proboscis, and how the elephant seals look in their natural surroundings.



ELEPHANT SEAL IN FIGHTING ATTITUDE WITH PROBOSCIS DRAWN UP. Photograph by C. H. Townsend.



WINDING A YEARLING ELEPHANT SEAL IN A NET FOR TRANSPORTATION TO THE SHIP.
Photograph by C. H. Townsend.

We found the seals to be without fear of man, and moved among them freely for the purpose of taking photographs and capturing the yearlings brought away alive. During the process of skinning the large animals saved for museum specimens, others equally large remained undisturbed within a few feet of where we were at work.

The young seals were rolled up tightly in separate nets like so many bales, to prevent their crawling out of the boats. On board ship, they were simply turned loose on the deck, where they were at liberty to wander as they chose. Later on they were penned up to keep them from obstructing the gangways. Otherwise they were not troublesome.

On the beach the young animals frequently squealed during their play, and we all noted the resemblance of their play, and the scream of the peacock. The old males frequently got into fights, when the large proboscis would be drawn well up onto the head, exposing the large canine teeth with which they struck at each other's necks. Their necks were all in a more or less

damaged condition from fighting. Guadalupe Island lies about 150 miles off the coast and is uninhabited. The seals occupy a beach under the cliffs on the northwest side which is not accessible from the island. The beach is well protected on the seaward side by a heavy surf which usually prevails there. During our voyage we called at San Cristobal Bay on the mainland, a locality once much frequented by elephant seals. but saw no signs of them. Guadalupe appears to be the last stronghold of the species.

A plan for the protection of the remnant at Guadalupe, through our Pacific coast Custom Houses has already been presented to the Secretary of State. If this plan is approved by the Mexican Government, it may be possible for the elephant seals to live undisturbed.

After leaving Guadalupe Island, the Albatross made a number of hauls with the deepsea dredge which yielded a good series of fishes and invertebrates from deep water.

The next stop was at San Benito Islands where considerable shore collecting was done. The ship then went to Cedros Island and from there to San Bartolome Bay, where a zoological recomasisance of Lower California was begun. Collecting parties were landed almost daily, as the ship moved around the Peninsula and up the Gulf of California. The outlying islands were also explored. Some of them are nesting grounds of great numbers of sea birds.

Many days were devoted to deep-sea investigations, including sounding, dredging, deep-sea temperatures, and the use of fine tow-nets in studying the minute life of the surface water of the sea. The deepest dredge haul was from a depth of 1,760 fathoms (two miles). The collection of fishes and invertebrates from great depths were large and important and much new zoological material was obtained.

A new and interesting feature of the deep-sea work was the making of plaster casts of deepsea fishes, before the specimens could lose their form and color in alcoholic preservatives. It will now be possible for the first time to make



MALE ELEPHANT SEAL SIXTEEN FEET LONG.
Note the long proboscis.
Photograph by C. H. Townsend.



DEER FROM TIBURON ISLAND.
Killed by Lt. Stanley of the Albatross.
Photograph by H. E. Anthony.

attractive museum exhibits of such forms of life.

The land work included not only the collecting of mammals, birds, reptiles and plants, but the collecting of fishes and marine invertebrates

along shore.

The scientific staff consisted of eight persons, representing the United States Bureau of Fisheries, the American Museum of Natural History, the New York Zoological Society, the New York Botanical Museum and the United States National Museum.

The expedition obtained 650 birds, 200 mammals, many hundreds of reptiles and a very large collection of plants.

Lower California, with its islands, is a desert region, and a large proportion of its animals and plants are peculiar to it. Many of the most interesting of these were obtained.

Several islands in the Gulf of California hitherto unvisited by naturalists, yielded new species. On Tiburon Island, about forty miles long and lying near the head of the Gulf, we obtained a new species of jack-rabbit and other new mammals of smaller size. The deer and coyote of Tiburon, of which specimens were secured, may also prove new to science. Impor-



BEAM TRAWL OF THE ALBATROSS.

A haul from a depth of two miles (1760 fathoms),
Photograph by C. H. Townsend.

tant finds on the islands of San Esteban and Ceralbo were new and large lizards as large as ignanas. Specimens of the black jack-rabbit known only from Espiritu Santo Island were obtained.

As director of the expedition, my own time was largely devoted to a study of the fishery resources of Lower California. The region is well supplied with fish, turtle and other sea foods, and there is an important pearl fishery which has been in operation ever since the discovery of Lower California.

The members of the scientific staff found the time all too short for the opportunities each day brought with it. All worked harmoniously, and all profited by the facilities provided by Commander Burrage and the naval officers under him.

RETURN OF THE SEVENTEEN-YEAR "LOCUST."

By RAYMOND L. DITMARS.

URING the latter part of May great swarms of the Seventeen-Year Cicada, improperly called locust, appeared in a number of areas adjacent to New York City. The legions of this vast brood simultaneously



emerged from the earth over a considerable portion of the eastern United States.

With the nearby woods resounding with the continuous hum of countless thousands of Cicadas, a great number of inquiries have come to us relating to the possible damage 1 to vegetation that will result from these swarms. Hence a review of the habits of this insect is appropriate at this time.

The Seventeen-Year Cicada, (Cicada septendecim), receives its name from its prolonged larval stage, which covers a period of seventeen years of subterraneous existence. At the

expiration of this time, the larva leaves the ground, crawls up a tree trunk or rough stalk of vegetation, and immediately prepares to transform into the imago, or winged stage. As it comes from the ground it looks much like a small crustacean, without mandibles. The anterior legs are of powerful development and provided with stout hooks. Gaining a firm purchase with these members it prepares

to shed the skin or shell. A median slit appears on the thorax or the back and from this emerges a blackish creature with bright red eves and translucent wings, moist and limp. Withdrawing the limbs from their old casing, the cicada crawls up the tree trunk to rest, while the wings extend and stiffen. Within a few

hours it is prepared for flight, but in its winged stage the perfect insect is permitted a very short respite in the sunshine and open air. Its duration of life is now but a few weeks-from twenty to thirty days at the most. Though a voracious feeder during its subterraneous life, the perfect insect is apparently unable to feed owing to lack of development of the mouth parts. The males are provided with vibratory organs attached to the posterior portion of the thorax. With these they make the monotonous hum characteristic of a locust swarm. The sound is in no way connected with the mouth parts, a condition existing among all singing in-

sects which impart their calls through various stridulating or vibratory organs. The female of the Seventeen-Year Cicada is of particular significance owing to the possession of a lanceolate ovipositor. It is with this weapon she deposits her eggs in the terminal branches of trees. When the eggs hatch, the young drop to the

ground and burrow. The incisions made by the ovipositor of the female Cicada result in the death of small branches and the malformation of some of the larger ones. This is the only damage from a locust swarm. In fruit growing areas it is liable to be serious. A forest visited by a swarm of this species of Cicada, assumes the appearance about three months after the insects have disappeared, as if a superficial fire had swept through it, tinging the ter-

minal branches of the larger trees and altogether killing a part of the very young, scrubby growth. The present insect is in no way related to the true locusts, the considerable number of species of which belong to the order Orthoptera, including the grasshoppers, which are immediately related to the locusts. The imagoes or perfect

forms of the Orthopterous insects are voracious and most of them comparatively long-lived. Migratory or true swarming locusts do not occur in eastern North Ameirca. The plains states are, however, menaced by these creatures the voracity of which causes great damage. A swarm of migratory locusts settling over cultivated areas leave a region barren of everything green to mark their ravages.

It is well to understand that the Seven-

erior **3** I SEVENTEEN-YEAR CICADA No. 1, male enlarged. No. 2, male from beneath; the white marks on the abdomen show the singing organs. No. 3 female from beneath, showing ovipositor.



TRANSFORMATION OF THE SEVENTEEN-YEAR CICADA.

From left to right is shown the progressive stages of transformation from the larval stage as it leaves the ground. The figure on the extreme left shows the powerful fore-legs of the immature form.

teen-Year Locust, or properly the Seventeen-Year Cicada, belongs to the Order Hemiptera, or suctorial insects. The species of this Order are not provided with mandibles, but obtain their nourishment by means of a stout proboscis. A familiar member of the order is the common locust or harvest fly, that occurs in this region during the hot weather of July, August and early September, producing a loud buzzing sound as it perches high among the trees. The harsh song of this Cicada—a large ally of the same genus as the one now with us—is the sound that is proverbially alleged to usher in the dog-day weather. The Hemipterous in-

sects exist in great variety of forms and habits. Some suck the juices of fruits and others live upon the blood of man and animals. A considerable number of the larger species inflict an extremely painful puncture with the proboscis, ejecting an acid at the same time that causes high inflammation. The writer has always been cautious in handling specimens of the periodical Cicada owing to the apparently powerful beak or proboscis of this species, but he has failed to note an example make an attempt to inflict injury with the organ or at any time to feed.

DISTRIBUTION OF THE PRESENT SWARM.

A number of distinct broods of the Seventeen-Year Cicada have been charted by entomologists. A few of these broods overlap in distribution, with the results that in some states, particularly Pennsylvania, swarms of the insects appear at periods of four or five years apart. New York and the immediate vicinity possesses a single brood, which appears above ground regularly every seventeen years. In the records of the United States Department of Agriculture, Division of Entomology, the various broods are known by chart numbers. The present visitation is charted as the 1911 recurrence of Brood II. The swarms of this breed occur in a number of counties in the easterly portion of New York as far north as Lake Champlain, on Long Island and Staten Island, throughout the state of New Jersey, eastern Pennsylvania, Maryland, Virginia and North Carolina. In New

Jersey where the Cicadas are appearing in enormous numbers, this insect has been regularly recorded every seventeen years since 1775.

The Mississippi Valley is now swarming with another important brood of the periodical Cicada, known as Brood III. Its distribution is more extensive than the easterly brood, and moreover, this southerly swarm is particularly interesting owing to its being a thirteen-year race. A number of these are charted on the records of the government entomologists.

CITY.

The swarms of the present brood of the Seventeen-Year Cicada appeared throughout the various areas in which they were anticipated in perfect fulfillment of the predictions of entomologists. The writer has made a number of observations of the 1911 swarms and assisted Mr. William Beutenmüller, the Curator



LARVAL SHELLS ON AN APPLE BOUGH.







ABANDONED LARVAL SHELLS AT THE BASE OF A TREE.

of Entomology in the American Museum of Natural History, in noting the appearance of these periodical insects in 1891. During the latter period, the weather remained quite uniformly warm and favored the existence of the insects. They were particularly numerous along the Palisades of the Hudson River on the New Jersev side and by the middle of June the females were busily engaged in depositing their eggs. Of the flora of this region the shrub oak suffered the most. A superficial examination of these showed the boughs and trunk to be slit and punctured in longitudinal furrows. Some of these injuries extended a distance of five or six inches. By the latter part of the summer a considerable portion of the shrub oaks had died, while those that survived contained many dead branches. Dead branches were numerous on some of the larger trees. The effect of the forest was much the same as if a superficial fire had swept through it. During the latter part

of June and a short time prior to the disappearance of the insects the males continued active, but appeared to be attacked by a fungus. The exterior of the body appeared whitish and the body itself a mere shell filled with a dull white, fungoid powder. A snap of the finger would send the fragile body flying into dust, although the thorax possessed enough vitality and fluid to actually enable the insect to escape in flight. The early days of July marked the disappearance of the perfectly developed insects.

Despite a cold and tardy spring the 1911 visitation came promptly on time. By the first week of June the greater number of the larvae were out of the ground. An interesting observation was made in the northern portion of the Borough of the Bronx. The Cicadas appeared in great numbers in this section of New York City, although they appeared to be restricted to wooded areas. There are vast stretches of open ground in the region mentioned, but these have





WHERE THE LARVAL FORMS EMERGED FROM THE GROUND.

Borings in soft ground.

Borings in a hard path.



MOUNTED SPECIMENS. Prepared for the schools.

been affected by grading and drainage. Such changes in the character of the soil appear to be fatal to the larvae. A marked illustration was a narrow strip of woodland along the East Chester Road. Here the ground was honeycombed with burrows and it was impossible to take a step without trampling the larval shells under foot. North of this was a partially improved or drained area, extending considerably over a mile and without traces of the insects.

Up to the 4th of June, there were no indications of the Cicadas depositing eggs. They appear to be extremely sensitive to low temperature and a cold evening so benumbs them that myriads fall to the ground and lie helplessly on their backs. They will not endure close con-

SEVENTEEN-YEAR "LOCUST." Cicada sentendevim.

This insect is not a true locust. The locusts belong to the order of grasshoppers and their allies, which are voracious feeders. Actual swarms of locusts are very destructive to vegetation, but these do not occur in the eastern United States. The damage from a swarm of the seventeen-year "locust" is superficial.

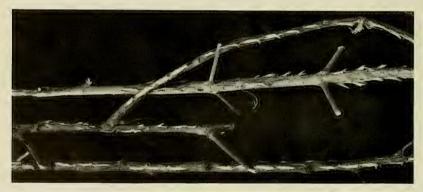
The present species lives in the ground for seventeen years. In the winged state it lives about five weeks. The eggs are embedded in branches of trees. From the point of injury the branch usually dies. This is the only damage done. The insect in a winged state does not feed,

DESCRIPTIVE LABEL. Back of tablet opposite,

finement and several batches of over five hundred each lived less than forty-eight hours.

The days of the 5th, 6th and 7th of June, were marked by a steady northeast wind, with intermittant rain and a low temperature. Observations on June 8, a day of bright sunshine and rising temperature showed that the swarms had not been permanently affected.

The entire day of June 10 was spent in investigating the swarms along the Palisades of the Hudson. The insects were particularly abundant in the vicinity of Fort Lee and Coytesville, New Jersey. Near these towns they existed in enormous numbers and the continuous hum from the trees was actually trying to the nerves of the observers. On this day the first



TWIGS IN WHICH THE FEMALE CICADA HAS DEPOSITED EGGS.

The powerful ovipositor penetrates the twig to a depth of at least a quarter of an inch, raising the small spurs of wood on the sides of the twig as shown in the photograph. Sometimes the punctures are so deep that the twig is twisted off by the slightlest breeze.

indications of oviposition was noted. Several apple orchards visited were so teeming with the insects that marked damage must result. Here the larval forms had burrowed their way through hard-trodden paths, which were riddled with holes. The shed shells were attached to the trees in clusters and masses. Several females were noted depositing eggs in branches bearing fruit. Careful measurement showed the ovipositor to have penetrated the branch to a depth of a quarter of an inch. The peculiar action of the ovipositor reduces the point of oviposition to a veritable pulp, depriving small branches from that point to the extremity of any possible nourishment. By sectioning branches we found that from two to five eggs were deposited at each point of actual puncture. By the 12th of June, the work of depositing the eggs had become general.

It is not difficult for the novice to distinguish the male and female insects. Both have the bright red eyes and there is little or no difference in the body color or form, but an examination of the under-surface will at once enable the observer to determine the sexes. The male is provided at the rear of the thorax—that portion bearing the limbs-with two nearly circular flaps, which look like large scales. These flaps cover the singing membranes. There is no indication of them on the female. The latter sex is characterized by a shining, lanceolate appendage at the rear of the abdomen. This is the ovipositor. It is incorrectly alleged that the male insects live but a few hours after leaving the ground.

As an important, though quite temporary feature of the Society's insect collection, the writer has prepared an exhibit of the living insects, daily collecting a number of specimens for the purpose. A life-history group is also exhibited, while to further the knowledge of the Cicada among the school children a large number of glass-covered mounts containing the locusts have been placed on sale at about the cost of making them. These mounts are in the shape of tablets containing insects that have been dried on setting boards. On the back of the tablets is a description.

WANTED.

One Copy of Zoological Society Bulletin No. 1.

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February 16-May 24, 1911.

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LAST LIVING PASSENGER PIGEON.

ELDOM has anything attracted any more attention to the Cincinnati Zoological Garden than the female Passenger Pigeon that is claimed to be the last representative of this species. This bird is now about nineteen years old, and was born in the Garden in a flock of Pigeons originally received from northern Michigan. The flock was kept in an open cage about twelve feet square, and consisted originally of ten birds. One-half dozen or more birds were hatched from this flock, and it was gradually depleted until in 1910 there were but two birds left. In that year the older of the two birds died, at an age of twenty-six years, leaving the female which is still alive.

This bird is still active, and for company it had until recently a male mourning dove. However, the male mourning dove has been placed in an adjoining cage, because, in spite of the fact that a very good painting of the bird was placed on the cage, some people had trouble in distinguishing the Passenger Pigeon from the mourning dove. When the flock was originally received the birds were not considered much of a rarity, and no more especial care was taken of them than of other birds. However, as the flock decreased in numbers, and the birds became scarcer, greater attention was paid to them, and special attention was paid to their feeding. As a result, we have had good success with them, and I really believe that if we could secure some younger birds our experience would enable us to raise young, and increase the flock from a small beginning.

The last remaining bird has been promised to the Smithsonian Institution; and, while it is hoped that it will be a long time yet before this bird dies, it is hoped that when the end does come it will be in good plumage and condition for mounting. Such was not the case with the old male that died about a year ago. He was moulting at the time and in poor condition, so that it was impossible to secure anything like a good result in the mounting of it.

S. A. Stephan, Gen. Mgr. Cincinnati Zoological Garden



PASSENGER PIGEON.
Now living in the Cincinnati Zoological Garden,



WHITE RHINOCEROS HEAD.

OUR WHITE RHINOCEROS HEAD.

THE National Collection of Heads and Horns has received from Col. Theodore Roosevelt, as a gift, a mounted head of a White or Square-Mouthed Rhinoceros, (Rhinoceros simus cottoni). The specimen was shot by the donor in the Lado District, west bank of the Nile, on January 28, 1910, and was mounted by James L. Clark, of New York. The head is very large, the horn is the second best of the series collected by Col. Roosevelt, and the mounting of the head is exceedingly perfect and life-like. In fact, it is believed to be beyond the reach of adverse criticism, and as a whole the gift is regarded as a grand prize.

The most remarkable feature of the head is its enormous length, forward of the ears, in proportion to its depth, in which this species of rhinoceros is quite unique. Its length from the crease immediately behind the ear to the end of the nose is thirty-six and one-half inches; the length of the front horn is twenty-five inches, and of the rear horn seven and one-eighth inches. The base of the front horn has a circumference of twenty-one inches, and that of the rear is seventeen inches.

The fact that the National Museum now contains the finest existing collection of specimens of the White Rhinoceros should be a source of pride to the Society.

W. T. H.

ZOOLOGICAL SOCIETY BULLETIN

Number 47

Published by the New York Zoological Society

September, 1911

NOTES ON THE SMALL MAMMAL COLLECTION.

Several noteworthy additions have recently been made to the collection of small mammals. Among the most important is a pair of Wombats. A Panda is for the first time exhibited in the Park, two species of the small East Indian cats have been added, the collection of wild canines has been strengthened, and the series of rodents has been materially increased. We are also able to report the acclimatization of a colony of Mink.

The possibility of exhibiting representative species of a considerable number of zoological orders renders the Small-Mammal House of particular value to students, and has prompted us to strengthen the educational value of this series by means of key labels. We have been anxious to show representative forms of the most important zoological groups of small mammals.

Our latest and rarest acquisition is a fine specimen of the Panda, (Aelurus fulgens), from the southeastern Himalayas, via Calcutta. The zoological position of this strange creature has long been a puzzle to systematists, some ranking it near the bears, and others next to the raccoons. At present it seems to stand undisturbed near the latter. In size and form it suggests the American marten.

Although this strange animal is frequently seen in the larger zoological gardens of India, and has been bred in the Calcutta Gardens, none seem to find their way to America in the dealers' shipments. For our specimen we are wholly indebted to Dr. P. Chalmers Mitchell, Secretary of the Zoological Society of London. who purchased it for us in London.



THE PANDA



GENET



SURICATE.



BLACK-BACKED JACKAL.

Recently we were able to secure, for the first time, two fine, large male and female examples of the Australian Wombat, (Phascolomys mitchelli). These animals are of marked interest in adding a type of development among the Marsupials that hitherto had been lacking in the collection.

In bodily bulk the Wombat almost equals the peccary. In structure and habits it resembles the larger rodents, and in general appearance it looks like a much exaggerated woodchuck. Like the woodchuck, it lives in burrows in rocky ground, feeds mostly upon roots, and in devouring such food the rodent-like structure of the incisor teeth is revealed. Our specimens are apparently good-natured and lazy, but as yet have not had time to become fully accustomed to their new quarters.

Another important marsupial in the Small-Mammal House is the Tasmanian Devil. The accompanying illustrations shows the stout build of this animal, and also its rather forbidding appearance. It is of carnivorous habit, and its sinitser name is derived from its rather savage temper and its black pelage. While this animal is alleged to be nocturnal, our specimen is active during the greater part of the day. It prefers, however, to eat at night, and if its food is thrown into the cage during the afternoon, it lays untouched until after dark. In keeping with the feeding habits of this and other nocturnal mammals, its food is not placed in its cage until the keepers are ready to leave for the night. With this custom in force, the night-prowling animals find their food quite fresh at the time they feel inclined to consume it.

With the animals mentioned, a series of Opossuns in the Small-Mammal House and several large Kangaroos in the Small-Deer House, the Order Marsupialia is fairly represented. Three species of Opossums are exhibited, namely: the Virginia, Mexican and the Murine. One of our Virginia Opossums is busy in rearing a litter of twelve young.

The Order Carnivora is elaborately represented in the Small-Mammal House. Among recent additions are an Indian Marbled Cat (Felis marmoratus), and a Malayan Jungle Cat, (F. planiceps). The latter species is characterized by a flattened head and much elongated canine teeth, the latter feature resembling the dentition of the Clouded Leopard, which is exhibited in a nearby cage.

We have many specimens representing the Dog Family, (Canidae), and it is our intention to exhibit them in a continuous series, as soon as possible. Owing to their various sizes and requirements, they are now scattered through a dozen eages, both in and out of the Small-Mammal House. Our examples have come from many parts of the world. Among the latest arrivals are two species of the Raccoon Dog, (Nyetereutes), coming respectively from Siberia and Japan. The Indian Jackal, Black-Backed Jackal, Australian Dingo, Central American Wild Dog, Striped-Tailed Dog and the Argentine Wild Dog all are represented in and about the Small-Mammal House.

We are not yet fully supplied with the smaller species of flesh-eating mammals. Our collection of viverrines is too large, and that of the mustelines is too small. We find the North American members of the Marten Family rather shortlived and "difficult." Among these creatures, the Mink is one of the most difficult to exhibit in captivity in small quarters. With a large number of species, it is not possible to give each one a great amount of space in which to live. The Mink is an exceptionally delicate animal as a captive, and our previous experiences with individual specimens in small quarters have not been satisfactory. The present Mink colony is composed of six active and healthy individuals, occupying a large amount of space. They have been on exhibition for about one year, during which period only one Mink has been lost. With the installation of this lot in more ample quarters, we determined to try also radical departures in their food. We had previously fed our Mink upon small scraps of lean raw beef, varying this about every three days with chicken heads or small birds. It was resolved to feed this family upon nothing but small creatures of the kinds they would be likely to find during their natural prowlings. As the majority of the Mink we had previously lost had died of gastro-enteric troubles, it seemed as though this had been brought about through feeding meat of too coarse muscular fibre. This seemed likely to be the case with the flesh of animals that were much larger than those normally preyed upon. The schedule prepared for the feeding of these Mink consisted of mice, sparrows, very young chickens, frogs and small fresh-water fish. Upon this diet, with one day each week to fast, these Mink have remained in the best possible condition. We are trying a similar diet with the smaller and more delicate species of cats, and thus far with good results.



TASMANIAN DEVIL.



ALBINO RACCOON.



MINK.



JARARACA.



HORNED RATTLESNAKE.

NOTEWORTHY REPTILES IN THE COL-LECTION.

A FTER waiting some years we are again able to exhibit a large and fine example of the Fer-de-Lance. This deadly snake inhabits southern Mexico, Central America, a great part of tropical South America and a few islands of the Lesser Antilles. It receives its name from the triangular or lanceolate outline of the head. Our specimen is about five and a half feet long, and its color is grayish-green, with dark, yellow-edged transverse blotches.

This snake is technically known as Lachesis lanceolatus. It is fairly common over the greater portion of its habitat, but we have always experienced difficulty in obtaining specimens, owing to the great fear inspired by this and a number of closely related species of snakes.

It is of interest to note that a representative of another species of Lachesis is on exhibition. This is the Jararaca-often called by the Indians the Yarara. It is technically known as L. neuweidii, and inhabits Brazil, Paraguay and Argentina. Differing from the Fer-de-Lance, it is quite vividly marked. The color pattern consists of alternating brown triangles, pointing up from the sides. The ground color is yellowish. The reptile possesses the characteristic triangular head of the genus, and is quick and vicious. When irritated it vibrates the tail until that organ is visually blurred by the rapid motion. The bite of this snake is alleged to be generally fatal. A South American surgeon, Dr. Vital Brazil, is now making specific anti-toxic serums for the bites of the various species of deadly snakes of his country.

At this time our series of poisonous serpents

is particularly large and representative. Another arrival is the formidable Russell's Viper, (Vipera russelli), an Indian and Malayan reptile that is also well known by its native name of Tic Polonga. This beautiful, chocolatebrown creature, with bold black rosettes, was the theme of one of Conan Dovle's best detective stores, "The Speckled Band." The Russell Viper is a thick-bodied, alert and vicious serpent which, in combination with the Krait and the Cobra, has substantially increased the human death rate of India. Sharing the cage of our specimen is a snappy and dangerous little oriental reptile known as the Carpet Viper. In a nearby cage is a colony of Nose-Horned Vipers. from southern Europe.

While enumerating recent arrivals among the venomous serpents, some of our rattlesnakes deserve mention. Of these there is a splendid series on exhibition. Seven species are represented, and two of these are probably for the first time exhibited in captivity. The latter are the Green Rattlesnake, (Crotalus lepidus), and the White Rattlesnake, (C. mitchelli). White Rattlesnake was captured during the investigations of Director Townsend, of the Aquarium, while in Lower California. Few examples of this reptile are preserved in the museums. It is a desert species, with a singularly broad, swollen head. Dr. Townsend's specimen differs from most of the examples previously known, in being decidedly pinkish.

It was through Dr. Townsend's work among the little known islands of Lower California that the reptile collection was enriched with a number of curious desert lizards. The majority of these are of a kind known popularly as Chuckawallas,—genus Sauromalus. Two species were



RUSSELL'S VIPER

captured. The representatives of one of these are curiously blotched, like a piebald horse.

It is difficult to induce captive examples of the desert lizards to feed, and the specimens described were not exceptions. After trying many things we found that the piebald specimens would at first take nothing but brightly-colored flowers. We now induce them to occasionally vary this diet with tender leaves of lettuce. A number of Rock Iguanas, with rings of sharp, spiny shields around the tail, were among Dr. Townsend's specimens.

The most spectacular addition to the series of lizards is a great Kabara Goya, or Ceylonese Monitor, fully seven feet long. This powerful creature represents the largest existing species of lizard. Our intention was to exhibit it in the open yards, but its prolonged journey from the East had developed a Cannibalistic appetite, and within an hour he had engulfed an iguana and two small tortoises. This serious offense was soon followed by a wandering inclination. A keeper who had been detailed to watch the newcomer discovered, as we had feared, that the big lizard was able to rear high enough to swing out over the curved guard attached to the fence. We interrupted the Kabara Goya as he stretched out on the path for a sun bath, and despite the vigorous slashing of his powerful tail, he was soon transferred to an inside cage. R. L. D.



NOSE-HORNED VIPER.

CARE OF THE WALRUS.

THERE is no animal in the Park that demands so much time for its grooming and feeding as the young Atlantic Walrus. Inasmuch, however, as "Flip" appears to be in the pink of condition, we feel well repaid for our labor. From his weight of 146 pounds, when he arrived here on September 17, 1910, he has increased to 225 pounds, and from his daily consumption of nine pounds of clams when he first came, his allowance has grown to twenty-eight pounds per day. His tusks are rapidly developing, and will be visible within about a month's time.

Flip's food consists entirely of clams and fish, and from the latter the bones must be removed. The walrus is fed three times daily, being given three meals of clams per day for two days, then two meals of fish and one of clams per day, for two successive days, when the plain-clam diet again begins. Soft clams and codfish are the only kinds of food that are acceptable. It takes some time to prepare twenty-eight pounds of clams, or the varied diet of clams and fish described. Each clam is examined in order to eliminate a possibility of ptomaine poisoning, and the fish is gone over in a minute inspection. to remove all traces of bones. It takes over two hours each day to prepare this animal's food, and to this must be added the daily scrubbing of the rocks surrounding his pool, and the regulation of the salt water in the same.

The salt water supplied the walrus is an innovation here. Last summer the animal was so troubled with blood-sucking flies that his skin became afflicted with sores, which for a time resisted all attempts to heal them. With the present summer we decided to try the effect of salt water, believing this would harden the epidermis somewhat, and render it less sensitive to the attacks of insects. A regular supply of Turk's Island evaporated sea salt was ordered, and by means of a salinometer the water in the tank was rendered of the same density as ocean water. We immediately detected a difference in the animal's swimming habits, and within two months he had undergone a transformation. A thick coat of bristly pale-yellow hair now covers his previously almost-naked skin, quite changing his color. He now appears quite immune to the attacks of flies, and is really in the pink of condition. With the ocean baths, and the preparation of his generous meals, the care of the walrus is more costly than that required by our largest elephant. R. L. D.



A PORTION OF THE INSECT COLLECTION.

THE INSECT COLLECTION.

DURING the summer of 1910 the exhibition of a series of insects was regarded as an experiment. Our visitors manifested so much interest in the collection that it was decided to make it a permanent feature. During the winter a large number of cocoons were placed on exhibition in the Reptile House, and from these visitors had an opportunity to observe both the local and the larger tropical moths emerging daily. The entire insect collection is now on exhibition in the pavilion between the Small-Mammal House and the Ostrich House, and it fills a series of forty-four cages and twelve tanks.

At present the most important feature of the insect collection is the series of cocoons. It contains specimens from Japan, eastern China. India, Mexico and the United States generally. A certain number of moths emerging from these cocoons are placed in breeding boxes. There is little difficulty in hatching the eggs, and a later feature of this display will be a series of the larvae, or caterpillars, of these species. A generous number of the caterpillars are already

feeding, and a fine brood of the commercial silkworm has spun the last of its cocoons. A panel of these is on exhibition over a descriptive label. The cocoons mentioned are of particularly lustrous and rich yellow silk.

The finest moths emerging from our collection of cocoons are being mounted, dried, and placed in tablets of cotton, over which is fitted a glass cover. On the back of each mount is a label giving the name and habitat of the specimen. These attractive mounts have proven popular as Park souvenirs, but really serve a double purpose. They are of value from an educational point of view, because they may be handled by children without injury. We are able to sell these mounts at very reasonable prices, and they are offered in the Bureau of Information at the Lion House. From present indications it appears that the sale of these specimens will cover the cost of the insect collection, including specimens, cages and collecting paraphernalia. Among the insects that have been exhibited, mounted and sold are the huge Indian Atlas Moth, (Attacus edwardsea), the Indian Luna Moth, (Actias selene), the Japanese Silk Moths,



SERIES OF INSECT CAGES



RED-WINGED LOCUSTS.

(Antherea yama-maia and A. mylitta), the Mexican Silk Moth, (Attacus orizaba), and the North American silk-spinning moths such as the Cecropia, Polyphemus, Cynthia, Promethea and Lana.

Owing to the success of the series of "singing" insects exhibited during the summer of 1910, this feature is again being brought together. The well-known fondness of the Japanese for singing insects suggests a new feature of interest for school children here. It is among the Orthoptera—the order of insects embracing the crickets and the locusts-that we find the predominating number of species of insects that sing. A cricket cage is prepared without trouble, easily maintained, and it is a decided novelty. Our cages provided for this purpose are fourteen inches long, eight inches wide and eight inches high. The front and sides are of glass, while the back is covered with a panel of \(\frac{1}{8} \)-inch screen. A screen frame covers the top. Half an inch of fine river sand is placed in the bottom. Several flat stones and pieces of bark are laid down, supported by pebbles, to serve as hiding places.



HERCULES BEETLE.

A meadow over which flat stones are scattered is a favorable place to collect crickets. They may be found by turning over the stones, and should be placed in a pasteboard box. It is the male cricket that sings, and the "song" is produced by rapidly rubbing specially developed portions of the wings. The males may be distinguished by the wrinkled black wings that cover the greater part of the body. The female has smooth, straight wings, while the body is provided with an elongate appendage that looks like a sting, but which is actually harmless, and is employed in depositing the eggs. Four pairs of crickets are enough to stock a cage. They may be fed slices of banana, melon, berries, lettuce or an occasional piece of raw beef. The uneaten food must be removed daily. When the fresh food is provided, the cage should be sprinkled, as these insects require water, although a little at a time is quite sufficient. A cage of crickets brings the music of the fields to the city home. R. L. D.



COCOONS OF AFRICAN LUNA MOTH.
(Actias mimosæ.)



COCOONS OF JAPANESE SILK-SPINNING MOTH. (Anthoria mylitta.)

ZOOLOGICAL SOCIETY BULLETIN.

ELWIN R. SANBORN, Editor,

Bevariments :

W. T. HORNADAY.

Mammal Reptile RAYMOND L. DITMARS.

Aquarium C. H. TOWNSEND. RAYMOND C. OSBURN, PH. D.

Ried C. WILLIAM BEEBE. LEE S. CRANDALL.

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SEPTEMBER, 1911

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WANTED: A CLEAN NEW YORK.

VERYWHERE in the streets and public parks of this city the lawless and disorderly ten per-cent, of the Public continues to strew waste paper and rubbish of many kinds. On Mondays, when the average commuter returning from the north looks out of the car window and sees green grass and woods bestrewn with the rags of Sunday newspapers and the residuum of a thousand lunch boxes, he knows that he has crossed the city line, and is once more in dear old New York.

Seven days in the week, -save for brief local intervals, while the street-cleaners' backs are actually in sight, -our littered streets are an evesore and a disgrace. Newspaper rags and waste paper prevail, nearly everywhere.

The tax-payers and the decent people of New York pay enough for street cleaning and police service to secure the cleanest city in America; but in comparison with Washington or Boston, we are filled with envy and regret,

Commissioner Stover is absolutely right in stopping the sale of dirt-making unshelled peanuts in Central Park; and every good citizen should uphold him in it. But how many have done so? In a city reeking with over-dense humanity, the unshelled peanut is a nuisance and a public pest. New York is a progressive city, but it has much to learn from Boston of excellent salted peanuts in paste-board boxes.

In the matter of rubbish-throwing in public places, New York contains the worst human element of any city in America. There is a lawless, defiant ten per-cent, that regards "liberty" and "license" as synonomous. Nothing but the mailed fist is adequate to curb them.

In the Zoological Park, we have striven against the lawless throwing of rubbish on our walks and lawns. We have made great gains, but the irrepressible conflict continues unabated. It is not a pleasant task, but we have resolved to have a clean park, or perish en masse in the fight to secure it. The expressions of approval that come to us prove that even in New York a clean park is appreciated.

And what of New York City as a whole, as to its streets, its horrible vacant lots, and some of its parks?

The many open expressions of dissatisfaction, and even of exasperation, that now are being heard and read, portend something. They mean that the time is ripe for a complete revolution in behalf of a Clean New York! The people who are dissatisfied with rubbish in public places, should seek action now; and the city government should set in motion this machinery for the production of the desired result:

The City should provide at least 5,000 refuse baskets and cans.

The Mayor should call upon all citizens to desist from throwing waste paper and rubbish in public places.

The Police Department should post notices printed in four languages—English, Yiddish, Italian and German—in about 5,000 places between the Battery and Mount Vernon, sternly forbidding the throwing of any waste paper, refuse or rubbish of any kind on any street, sidewalk, park or vacant lot, under penalty of arrest and punishment.

The Police Commissioner should order every policeman to become active, and remain so, in the vigorous enforcement of that order.

Every adult offender should be snatched off the streets, and hustled into court.

Every police magistrate should punish every offender, and let no man off with a mere reprimand.

The abominable spitting habit was completely broken up in this city in less than three months! The rubbish-throwing habit could be broken up quite as effectually and as quickly, provided the mailed fist will come to the front.

The time to begin a drastic reform in behalf of a Clean New York is NOW. W. T. H.



OUR WARNING NOTICE.

ZOOLOGICAL PARK NOTES.

"Silver King," the Polar Bear,—At last the great polar bear captured a year ago by Mr. Paul Ramey, is becoming reconciled to captivity. He has ceased to complain about it, his temper has noticeably improved, his appetite always has been very good, and his pelage is now immaculate. In fact, so far as appearances go, he is probably as large and handsome a polar bear as can be found in captivity.

A few persons have hastily concluded that because Silver King is a polar bear he is necessarily "suffering" in his present confinement. Mentally, he would of course be better satisfied with the freedom of the ice floes of Kane Basin; but that we can not provide. He has more cage-room than he utilizes for exercise, a sleeping den, and a swimming pool of ample proportions for his confort. Even it his cage were five times as large as it now is, it is doubtful whether he would utilize more than one corner of it; for of all our bears, the polar exercises the least.

A Strange Fatality.—We were unfortunate in losing one of the female examples of the Congo sitatunga, which beautiful species of antelope is quartered in the Smail-Deer House. Hearing a disturbance, the keeper found the animal lying dead in the corral, with its neck broken. The occurrence was at the time inexplicable, owing to the absence of any-

thing tending to alarm the animals.

The next day, we were amazed to observe a near repetition of the tragedy. A male sitatunga was seen to bound into his corral, strike the fence with great violence close to the spot where the female fell, rebound from the wire, but escape with nothing more than superficial lacerations. The only cause assignable for such strange actions without apparent disturbance, was the presence of stinging insects. Investigation disclosed the correctness of this surmise. A nest of hornets was found under the caves of the building, directly over the door leading into the correal, and forthwith it was destroyed. It is possible that the bright colors of the sitatungas had attracted and excited the insects.

New Malay Tapir .-- A newcomer arrived at the Elephant House on August 4. This was a female Malay tapir purchased from Captain Percy Watson, of the steamship "Muncaster Castle" from Chinese ports and Singapore. With the tapir we received a number of interesting birds, and some small mammals. From the disposition of the tapir as studied while the animal was in its crate, it seemed possible to put a rope about the neck of this alleged tame creature, and lead it to the Elephant House. We decided otherwise, however, and later on were thankful that the newcomer had occupied her crate until the moment of her liberation in the yard. Once liberated she completely lost her head, and plunged frantically in all directions, wildly pawed at the soft earth in the corners of the corral, and finally made an unsuccessful attempt to climb the fence. The shrill, whistling calls of our old tapirs had no quieting effect upon her nerves. It was hours before this attack of hysteria subsided; but now she is as docile as a rabbit.



THE WORLD-RECORD WHITE-TAILED DEER HEAD.

HILE we are not unduly zealous regarding antlers of deer, elk, moose and caribon that widely depart from the standard horn architecture of their respective species, it is yet well worth while for the National Collection of Heads and Horns to contain a sufficient number of extra-fine examples to illustrate the kinds of antlers that are popularly known as "freaks." Naturally, the variations in freak antlers are very many, and in our view it is only the finest examples, or the strangest forms, that are worth considering.

Last year the State of Maine yielded the remark-

able White-Tailed Deer head shown above. It came

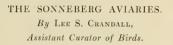
to us as the gift of Mr. Henry A. Caesar, of the Zoological Society, and was mounted and furnished by the S. L. Crosby Company, of Bangor, Maine.

The antlers of Mr. Caesar's gift are very long, very massive and wide, and fortunately retain all the characteristic horn architecture of the Northern White-Tailed Deer. The measurements are as follows:-Length of beam, 29; circumference, 6; widest (outside) spread, 27%; points, 18 + 24.

These measurements, taken all in all, seem to make this splendid head No. 1 in the world's list of the greatest heads of this species.



THE PHEASANT AVIARY.



A VICULTURE has never been a popular pursuit in America; and just why not, is rather difficult to say. It is not lack of interest in captive living birds, for thousands of canaries and large numbers of more interesting species, are imported annually by the two or three dealers who monopolize the greater part of the trade. Unfortunately, very many of the persons who purchase these songsters possess only the rudiments of knowledge of their proper care. Their avian interests are generally confined to the one or two individuals which chance has brought into their hands, and rarely lead them to engage more extensively in bird-keeping.

There is another factor, however, which undoubtedly has had much influence in bringing about this condition. As wild birds near at hand are the ones most apt to be caged by beginners, the passage of certain bird-protection laws has had the unfortunate effect of reducing to a minimum the possibility that the first impulse toward this fascinating study might be received from the keeping of native birds in captivity. As a result, American aviculture is confined to the public zoological parks and gardens, and the collections of a very few private individuals, whose numbers, happily, are now rapidly increasing.

Among the larger of the private establishments is that of Mrs. Frederick Ferris Thompson, at Canandaigua, New York, which may well be regarded as a model for its kind. "Sonne-



THE PARROT HOUSE.

berg" is an estate of very considerable extent, about fifty-two acres being walled in to form the home grounds. These have been developed very successfully, along unusually artistic lines. The aviaries are open to the public on every Saturday afternoon from two until five o'clock, and the entire park is likewise open on the second and fourth Fridays of July, August and September. Thousands of people from Canandaigua and neighboring towns take advantage of this hospitality, and enjoy the grounds on those days.

The aviaries occupy an area of about one acre. They had their inception in one of less pretentious dimensions which Mrs. Thompson saw in California. The first of the buildings, known as "The Aviary," was built in 1902, and the Pheasant Aviary, which completes the construction originally planned, was completed in 1909. The houses include the large Aviary, the Jay House, the Parrot House, the hospital adjoining, and the Pheasant Aviary. On July 21, 1911, the collection consisted of 891 birds representing 246 species.

The Aviary contains an indoor space of fifty by twenty-seven feet, with an attached flying cage thirty feet high by fifty feet in diameter. Exclusive of this, there are offices, an observation room and a small museum as yet undeveloped. The house is built of wood and cement, the roof, one end and the side toward the flight cage being entirely of glass, which is protected by one-half-inch diamond-mesh wire. Numerous roof ventilators and the openings for flight allow the free circulation of air that is necessary to offset the heating effect of the large expanse of glass.

In winter, warmth is provided by hot-water pipes, which encircle the room at a height of about six feet. These are protected by eighteeninch shelves, which, being covered with sand, form convenient resting places for the birds. The cement floor is carpeted with sand and has in its center a fountain, the pool of which measures four feet by five. Nest boxes are attached to the walls in convenient positions, and in one of these a single pair of black-cheeked love-birds has reared nine young.

The attached Flying Cage is dome-shaped, the lower portion being covered with one-half inch bar-mesh wire with the transversals four inches apart, the upper part with one-half-inch diamond-mesh wire. Water is supplied in a pool twelve feet by five, the depth gradually increasing to sixteen inches. No living trees are included; but hemp, millet and canary plants form a dense mass which it has been necessary to clear in spaces. It has been found best to clip the tips of the hemp before the seeds mature, as these might have an injurious effect if eaten too freely by the birds.

In this miniature jungle, bob-white and plumed quail were nesting, and as the place was disturbed as little as possible, it may be that other nests were hidden in the dense tangle. Small, thick-topped dead trees are placed at frequent intervals; and one of these contained sixteen completed nests of various species of weavers. It may be added, however, that fertile eggs are rarely laid by these over-zealous builders.

This Aviary and Flying Cage contained no less than 600 birds, of very diverse species. Breeding results have been quite remarkable, when the size of the community is considered, for the following young have been reared to maturity; California quail, bar-shouldered dove, (Geopelia humeralis), scaly dove, wood duck, cockateel, black-faced love-bird, undulated grass parrakeet, yellow grass parrakeet, saffron finch, gray Java sparrow, white Java sparrow, cutthroat finch and zebra finch.

Among the large number of birds kept in this installation, it is highly regrettable that so few are of native species. A few specimens of the more common finches, a cowbird and some mourning doves complete the list of those on hand at the time of the writer's visit. The cause is not traceable to a dearth of available species in the wild state, but to the fact that American aviculturists who are privileged to keep indigenous birds are compelled to depend upon their own resources for securing specimens. Too stringent protection laws do not favor the development of

expert bird-catchers, without whose aid the formation or maintenance of a large collection of native birds is a practical impossibility.

The exotics confined in the Aviary, however, included a number of unusual species. The rarest was undoubtedly the Indian spur-winged plover, (Hoplopterus spinosus). This bird, while common enough throughout the Indian Peninsula, is decidedly uncommon in captivity and the single specimen at Sonneberg is probably unique in America. The series of whydahs was uncommonly good, including pin-tail, (Vidua serena), paradise, (Steganura paradisea), red-collared, (Coliostruthus ardens), giant, (Diatropura progne), yellow-backed, (Penthetriopsis macrura) and red-shouldered, (Urobrachya axillaris). The gray-headed and Cape sparrows, (Passer diffusus and P. arcuatus). were the best of the Fringillidae, while the triangular-spotted and bare-eyed pigeons, (Columba guinea and C. gymnopthalma), were in faultless condition and plumage. It may be noted in passing that while pigeons offered by dealers as Columba guinea are almost invariably the dark-rumped species, C. phaeonota, the birds in this collection were undoubtedly the firstnamed.

The next building is the Jay House. It is thirty-five by ten feet, with a height of about eight feet in front, sloping to six feet at the rear. It is built entirely of wood and has no adjoining flight cages. The fronts of the four compartments are so arranged as to permit their being covered with fine-mesh wire netting during the summer, and by glass for the winter, so that the inmates can always be seen from the walk which leads past the house. Here were kept choughs, (Graculus graculus), sulphur-breasted toucans, greater hill mynahs, lanceolated jays, (Laletes lanceolatus), red-billed blue magpies,



THE PHEASANT AVIARY.

(Urocissa occipitalis), and a very fine longtailed glossy starling, (Lamprocolius caudatus), besides several less important species. As this building is unheated, the less hardy birds are caged elsewhere during the winter.

The Parrot House is an L-shaped building. and the only one which is open to the public. It is built of wood and concrete, in the same style as the others. The six-foot public space occupies one side of each arm of the L, the first of which is fourteen feet wide and twenty feet in length. It is divided into three cages eight feet by ten, and a fourth eight feet by sixteen, all being fronted with bar-mesh wire, of varying size. The first three are devoted to macaws and parrots, several uncommon species being represented. Most noticeable were the greater Vasa parrot, (Coracopsis vaza), Maximilian parrot, (Pionus maximiliani), Jardine parrot, (Poeocephalus gulielmi), and a good Senegal parrot, (P. senegalus). The large cage, separated from the preceding by a four-inch space, contains a very good collection of the smaller finches and waxbills and other of the more delicate birds. Most of the common species of the former were represented, besides specimens of the Bicheno finch, (Stictoptera bichenovii), chestnut-breasted manakin, (Munia castaneithorax), and Javan manakin, (M. ferruginosa). Of the fruit-eating birds, the most striking were the yellow-bellied bulbuls, (Pycnonotus aurigaster), and the golden-fronted green bulbul, (Chloropsis aurifrons).

In the angle of the L and also separated by a four-inch space, is the cockatoo cage. This contains all of the species commonly seen, about ten in number.

The last cage contains the parrakeets, the pride of Sonneberg. This is really a remarkable collection, and without question one of the very best in this country, some thirty species being represented. They live together in the one large cage, preserving an unusual harmony among themselves. In this group the rarest bird was doubtless the black-headed parrakeet, (Conurus nenday). This is not uncommon in European collections but is seldom seen on this side. Others noticed were a very fine Barnard, (Barnardius barnardi), a white-eared, (Pyrrhura leucotis), several red-rumps, (Psephotus haematonotus), and a pair of blue-bonnets, (P. xanthorrhous).

At the far end of the Parrot House, separated from the birds by a solid partition, is a wellequipped hospital room, a very necessary feature of all extensive collections, but too seldom provided. The floor is of concrete, so that it can be cleaned and disinfected thoroughly. Around the walls are placed cages conveniently small, and light is obtained from windows at the front.

The Pheasant Aviary completes the chain of installations. The house is of wood, with cement floors and is 100 feet long by sixteen wide. The eight cages into which it is divided open into the same number of yards, forty feet deep, well shaded by fine old apple trees and planted with grass and shrubbery. The frame-work is formed of iron piping, over which one-half-inch square-mesh wire has been stretched, no provision having been made to prevent fighting between cock pheasants in adjacent runs. Most of the common species have been or are kept, but less attention has been given to this group than to some others.

The birds have the general supervision of Mr. A. P. Wilbur, superintendent of the estate, but are under the direct care of Mr. E. A. Watts and four assistants. All of the members of the collection seemed very fit and healthy, and are living evidence of the care and solicitude with which their every want has been satisfied.

The Heated Term and the Animals.—During the severely hot ten days of July, we watched the condition of our animals with close attention. As a matter of fact, during that period nearly every living creature east of the Rocky Mountains,—man, beast and bird,—suffered discomfort; and many people died from heat distresses. Although we were very anxious about our animals, the death rate was sensibly increased by the heat only to the extent of three or four small crocodilians that actually died in and around their outdoor pool from the heat!

around their outdoor pool from the heat! A Bactrian camel fell dead during the middle period of a particularly hot afternoon, and we ascribed that fatality to the heat. An autopsy happened to be impossible. As usual in hot spells, the cage floors in the animal buildings, and the floors of the bear dens, were wet down several times each day. The herds of musk-ox and mountain goat endured the weather quite as well as any of the other large animals, and without any sickness or fatality.

On the whole, the animals seemed to be quite as comfortable as the visitors, and there was no noticeable increase in the death rate. The Siberian tigers bathed frequently, and so did all the bears except the polars. Owing to the water famine, the luxury of running water was forbidden, but for the serious needs of our charges, we had water enough. The steam pump that we purchased and installed at the beginning of the water famine enabled us to pump from the Bronx River an adequate supply of water for the Italian Garden, and all the plantings and lawns of the Concourse.





SOUTH AMERICAN BIRD-KILLING SPIDER.

TEXAS BIRD-KILLING SPIDER.

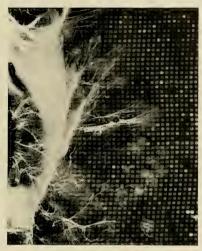
POISONOUS SPECIES IN THE INSECT COLLECTION.

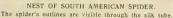
ROM the trend of many questions coming from our visitors, we note a uniform interest in all wild creatures that are particularly dangerous. Among the reptiles and the insects special attention is always directed toward the poisonous species. Hence it was our aim in establishing the insect collection to display a good series of those species that are able to inflict bites or stings that are highly painful or dangerous to man. It should be explained, however, that a great number of the really poisonous members of this collection, such as the centipedes, scorpions and spiders, are not true insects, but, according to technical view, belong to distinct classes immediately adjacent to the Class of Insects. The centipedes are regarded as near allies of the insects. The scorpions and spiders are embraced in another order, following. In general structure and chitinous covering, as well as their modes of life, these creatures appeal so strongly to the characteristics of insects that it seems quite proper to include them within a collection of the former.

The most dangerous specimens in our collection are the centipedes. The most spectacular cage in the series is one containing an enormous example of a South American species, Scolopendra gigantea. This ugly creature, which is fully as wicked as it looks, is eleven inches long, and with the legs spread, it is about two and a half inches wide. It was captured by Mr. R. R. Mole, near the city of Port-of-Spain, on the island of Trinidad; and it is to Mr. Mole that we are indebted for many interesting tropical specimens now on exhibition here. This centipede is fed, every five days, on a freshly-killed, half-grown mouse, which, with the exception of the skull, is entirely devoured.

The bite of a creature like this would be highly dangerous to man. In structure the fangs of the centipede are much like those of snakes. Venom is ejected from their tips, and with specimens half the size of ours it is possible for the unaided eye to detect the outlet for virus on these formidable weapons. Attached to a dead specimen of this species, which was sent to New York by the surgeon of one of the vessels of the U. S. navy is a note which explains that a sailor was bitten by this centipede, and despite every medical attention was, for several hours, in great danger.

Scorpions are an interesting feature in a collection of insects, but are difficult to exhibit in a satisfactory manner. They are very retiring in habit, and, in fact, light is so distasteful to them







GIANT CENTIPEDE.

An eleven-inch specimen, from Trinidad.

that unless provided with means of hiding, they will not feed. Our examples are generally secreting themselves under the flat stones of their cage. When disturbed they move about in lively fashion, holding the sting-tipped tail well elevated. Unlike the centipede, the venom is sprayed about the wound. The curved sting has no orifice at its tip, and is intended to be used only as a lacerating organ. The virus is sprayed from pores at its base. Though exceedingly poisonous, the sting of the larger New World scorpions cannot be rated as actually dangerous to man. Our specimens come from Cuba. They are about two and a half inches long, and of a dull reddish hue. Their food consists of softbodied insect larvae.

Through unusual vigor displayed by our collectors, we are rather too elaborately supplied with huge spiders of the genus Mygale, commonly known, though not quite appropriately, as the Bird-Killing Spiders. Three species are on exhibition. Altogether there are twenty-two specimens, which were collected in Dutch Guiana, Trinidad and Texas. Owing to their quarrelsome dispositions and cannibalistic appetites, it is impossible to keep more than a pair in a cage. In caging these examples we found the sexes evenly divided, and our big spiders

occupy a series of eleven cages. Despite the cage space thus consumed, there is here an interesting study of the tube-building skill of a number of the specimens, particularly those from South America. In a wild state these big spiders live in holes in decaying trees, or in burrows in soft ground, lining their homes with a sheet of gleaming silk. To provide them with anything approaching wild conditions would mean that the spider would immediately retire from view. In their bare cages these specimens construct a silk tunnel in one corner, from the top to the bottom of the cage. The wall of this shelter is exquisitely white, and so tough it is difficult to tear it with one's fingers.

Our big spiders are alert, but not particularly vicious. They show marked individuality as regards their temper. Some of them pay little attention to the operation of cleaning their cage, while a few are ugly enough to jump at a keeper's hand. Their powerful fangs are provided with an orifice at the tip for the ejection of venom.—alike in structure to the virus-conducting weapons of the centipede, and of serpents. Small mammals quickly succumb to the bites of these spiders, but we find their preference is for insect prey. Their bites are alleged to be highly dangerous to man.

R. L. D.



A LOAD OF SPONGES.



FISH FANCIERS.
Pelican tame by his own initiative.



A FISH MUST TRAVEL DOWN TO ENTER A "POT."

NOTES ON THE FISHERIES OF KEY WEST.

By CHAPMAN GRANT.

THE Aquarium has recently placed on exhibition a large number of tropical fishes obtained by the writer at Key West, Florida. This is a new collecting ground for the Aquarium and the following notes may be of interest to readers of the Bulletin.

The fish market of Key West is a revelation to the northerner, for instead of buying fish from a counter or off a block of ice one goes to the market dock and selects the fish alive from a fish car, a large slat box floating in the water, or from the well of a smack. Every fishing boat is fitted with a large central well extending to the bottom of the boat and riddled with auger holes to permit a free circulation of the water. The fish are placed in the well as soon as they are caught so that they reach the market alive and in good condition. This is a necessary proceeding in the tropics where fish decompose so rapidly after death.

A majority of the fishermen prefer to pay market fees to the owner or lessee of the dock and retail their own fish, others sell all their catch to the market owner. The housewife or maid, or more frequently the head of the house comes to the dock and after a general conversation and exchange of gossip says to the negro fisherman, "Any grunts" !-- almost a staple-or he may ask for grouper or vellowtail. The fisherman takes his dipnet and scoops the desired fish from the well, and if an agreement is arrived at in regard to the price the fish are hit on the head with a club, cleaned, scaled and tied together on a piece of palm fiber and handed to the purchaser. The variety to choose from is large and is still more diversified by crawfish and stonecrabs or jewfish steak. These fish are by no means as cheap as one would expect. A crawfish brings about ten or fifteen cents and the crabs thirty-five cents a dozen with fish correspondingly high.

The killing of fish at the market is an interesting proceeding. Fish larger than grunts, porkfish or yellowtails are not killed with the "bruiser," but after being scooped to the dock are pierced to the brain by one blow from a poker-shaped iron bar, and as one watches a strongly marked grouper or brilliant hogfish or a dark turbot, it fades to an ashy gray in about seven seconds after being killed. The startled observer glances again at a live fish to see if it really is the beautiful creature he took it to be. The color of the dead fish returns again almost

completely in about three minutes or less. A jewfish, from sixty to three hundred pounds or more, is killed with a hatchet and the scales are removed in blankets by being cut along near the skin and as the blanket rolls off before the knife of an expert the immaculate white skin of the fish comes to view. Several other fish, such as the turbot, grouper and hogfish are skinned in the same way, but most varieties are truly scaled.

A fishing trip with one of the fishermen is very interesting. He goes out in a motor boat, over the shallows, and the smooth coral bottom is plainly visible with here and there a patch of eel grass and worthless sponges growing firmly attached, for the cyclone of two years ago swept away all the "roller" sponges, and the sponges of commerce have been thinned out by the fishermen. Sea stars and plumes diversify the sea floor till he anchors off some key where he knows of certain shoals. He sets his pot and commences fishing with lines, but the treat for a novice lies not in the fishing but in looking through a water glass, a glass bottomed bucket, at the wonders of the shoals. The shoals are made up of huge round living coral heads which stand clustered together with smaller ones interspersed like soap bubbles, and in the interstices lie "sea eggs," the long-spined sea urchins which keep their barbed spines slowly circling about in warning to any trespassers. Between the coral heads from place to place there is a "white hole," with a white coral sand bottom, and possibly you will see what you call out as a "nice little grouper," but when the fisherman takes the glass and proclaims it a sixty-pound jewfish you look again and can hardly realize that there is such a difference in depth between the white hole and the heads. On taking the "grains," or spear, and making a futile jab you realize that to a novice the differences in depth are as deceiving as a moonlight perspective. The real wonders are the fish, for you see through the glass-bottomed bucket almost as clearly as through the air, and the brilliant parrot-fish, blue tangs, blue heads, Spanish hogfish. cockeyed pilots and schools of grunts and snappers pass in constant review before your delighted eyes and many strange and beautiful fish surprise you if you are not acquainted with the fauna and know what to expect. Possibly a squall will come up with its usual accompaniment of a water spout and causes you to look disquietly toward the roofs of Key West just showing on the horizon; but a squall is more of a shower than anything else, and the forming of the water spout absorbs your attention.



BUYING "GRUNTS."



LARGE JEWFISH, IN "FISH-CAR" BESIDE A SMACK



A BIG JEWFISH, KILLED WITH A HATCHET.

Some of the fishermen who have larger boats go out for a week and return with a load of groupers. If one has no motor and is becalmed there will not be enough circulation in the overcrowded well and many of the fish will die unless bailing is resorted to for aerating the water. Often a boat with a motor will tow in its becalmed brother and thus save many dollars worth of fish, or the fisherman may resort to sculling his heavy boat. It is a strange thing that rowing, which is so much more effective, is here seldom practiced,-it is a matter of custom like paddling among the Indians. Most of the fishermen take fish pots along with them to set while line fishing. The pot is made of wire woven into a heart-shaped box with the entrance at the depression, and the bait,-crawfish with the legs and feelers removed as "they would frighten the fish," is fastened at the apex. The fish must enter the funnel-like entrance downwards to secure the bait and he seldom looks up to find his way out, but noses around the wings or tries to force his way through the sides. If the fisherman knows where a jew-fish lives he will endeavor to get a "jack" or a "runner" for bait, and watching the big bass through his water glass he lets down the tempting live bait and knows just when to pull.

The favorite bait among fishermen is crawfish, which they procure by "striking"-spearing them as they hide during the day under rocks in a few feet of water, or they are taken at night with a "bully," a long handled net, to which they are attracted with a light. Another bait much used is "sardines," the fry of several fish, principally herring. To catch these two men get overboard in the shallow water around the market and with a seine made of potato sacking, round up quarts of the little fellows. The Cubans, or others who intend to fish for sport, catch this bait by letting down a piece of mosquito netting stretched on a hoop the while they masticate a sweet potato and spit the resultant lure over the net, and when a number of the little fish come to feed the net is slowly drawn up and the fry secured. Others prefer to catch their bait with tiny hooks on a thread, but these enthusiasts are mostly boys. Five cents purchases about a quart of this bait when it is to be had.

Turtle steak to eat or make soup from is the best treat for the northerner, or very good clams, turtle eggs, or conchs can be had. Conchs retail for five cents and the meat can be removed only by mutilating the beautiful shell by chopping off the apical whorls and twisting out the animal, or the most expert chop a narrow incision near the apex, and, by severing the upper part of the body of the conch, the animal is easily removed. It is then cleaned and pounded and generally served raw in salad. The turtle eggs are as good as hens eggs and sell at about the same price. The "valler aigs," clusters of velks taken from turtles, sell for thirty cents a pound, or when salted they bring more, as they have dried somewhat but have lost none of their food value for cake making. Green turtle up to thirty pounds or more is called "chicken," and sells for ten cents a pound. Larger turtles sell for less, and those weighing two hundred pounds or over are sold by the head. The meat of the valuable shell-producing hawksbill turtle is more highly esteemed than that of the green. The products of the ruddy skinned loggerhead turtle are inferior, and those of the trunk or leatherback are inedible.

ZOOLOGICAL PARK NOTES.

Bathing Tigers.—The two Siberian tigers exhibit a trait very unusual in cat animals, and that is a habit of going into water. The male of this really magnificent pair of great cats will not only stalk into the pool in their cage, but lie down in the water, drop his meat to the bottom of the tank, then "duck" for it. These animals are far less spectacular in their summer coats than during the winter, when they are covered with hair so long and fluffy it seems like a good imitation of wool. They give promise of attaining huge proportions. This northerly phase of the tiger attains the greatest size to be found among the big cat animals.

Breeding Black-Tailed Deer.—We are particularly proud of the success of Keeper Quinn in rearing the Columbian black-tailed deer twins. Born at a time of the year when captive individuals of this delicate species are much enervated, we were none too sanguine of bringing the mother and her babies past the crisis. The young are now old enough to nibble over a pan of specially prepared food, and the mother is rapidly gaining strength. There was a time when we despaired of keeping the black-tailed deer, and the mule deer, but a thorough study of their diet has brought success. We now have several vigorous specimens, and have bred both species. The antlers of our largest mule-deer buck are unusually large and fine, and attract much attention.

The New Anacondas.—The reptile collection has been enriched by the birth of forty-eight anacondas, and all of them are vigorous, and appear destined to survive. The mother is a prize specimen, nineteen feet long and of greater diameter than our largest pythons. She arrived here about four months ago, from the island of Trinidad. The young anacondas are thirty-eight inches long, take to water like ducklings and will soon be ready to begin feeding upon mice. Young anacondas always fast for a period of about ten days after birth, during which time the mother pays little or no attention to them.

Rare African Moths.—During the past few days visitors have been fortunate in observing specimens of a rare and beautiful moth emerging from their silvery, egg-shaped cocoons. These were examples of the African luna moth, (Actias minosae). They are of a beautiful pale green color, with dashes of lilac and soft brown, and the wings terminate in long, flowing "tails." An observer remarked that these insects exhibited the outlines of a monoplane.

New Iguanas.—Eight exceptionally large South American iguanas have been purchased and installed in the lizard yards. They are the largest examples of this species ever exhibited in the Park. Two of them are each considerably over five feet in length. Their majestic poses, and eccentric decorations of spines and tubercles, bring to mind the outlines of certain prehistoric reptiles. The new specimens are feeding upon lettuce and bananas. In their native country they are alleged to be very palatable as food, and are sold in large numbers in the markets. The flesh is described as looking and tasting much like that of chicken.

The Woolly Monkey.-We are often asked why the specimen of Humboldt's woolly monkey is quartered outside of the Reptile House. It should be explaned that this animal is very delicate, and requires individual care. He has been in our possession about eight months, and is in fine condition. During the early hours, when the keepers are engaged in the work of cleaning the floors, this monkey is allowed to roam at will. It is much interested in the snakes, and climbs to the wooden ledges outside the cages where it has much to say about its likes and dislikes, -through the glass. Without any discernable reason, this monkey has contracted an intense dislike of the walrus; and occasionally it wanders out to the pen of that animal, where it starts a series of such intense screams that it soon attracts a crowd of observers,-who ask many questions.

A Prairie Scene in New York.—During the hot and dry days of the past two months, the surface of the buffalo range has suffered from too little rain and too much heat. The short grass has turned brown, and the buffaloes have established a series of dust wallows. To look out over this rolling plain in its present condition is to immediately recall the prairie country of the great West. Clouds of dust rise from the wallowing of the largest bulls, and all of these animals seem really to enjoy the dry and parched condition of their "stamping-ground."

Condition of the Musk-Ox Herd.—Without an exception, the members of our musk-ox herd passed through the recent hot spell in fine condition. A large shed has been erected in the yard containing the main herd, thus affording ample shade. The five specimens received last year are rapidly growing, and soon it will be necessary to give them more room. Even in it's summer coat, the two-year-old female example from Melville Island is much admired. From a distance, the long outer hair of these animals looks heavy, and far too generous for the present weather. Close inspection, however, shows that the fine, woolly under coat has been shed, and without it the long rain-coat of outside hair is so loose and open that in hot weather it is not unduly warm.

The Spectacled Bear,—The large and varied collection in the Small-Mammal House is in thriving condition, and passed through the recent hot spell without a single mortality. "Frederico," the spectacled bear, has been removed from that building to a temporary special cage at the north end of the Bear Dens, where he will remain until the new bear dens are completed.

The Ape Exhibition,-Steadily increasing crowds daily watch the feeding of the chimpanzees and orangutans. It is indeed a rare sight,—the assembling at table of nine of the great apes. "Baldy" is perhaps the favorite, owing to his clown-like capers; but the serious acts performed by "Susie" have won much praise. "Little Dick," the small chimpanzee who jumps with such alacrity into the doll's carriage to be wheeled by "Susie" about the arena, has been several times in the hospital, owing to extreme impatience at meal times. He has a habit of pounding on the rear door of his cage as the feeding hour approaches. If the keepers fail to notice this signal of his readiness to be placed at the table, "Dick" thumps the door with his head, and spins about in such a frenzy of rage that his cage-mates fly before him. In one of these impetuous exhibitions "Dick" broke his leg. A plaster jacket was applied, and with this the chimpanzee,-to our great alarm,-used to pound vigorously on the floor to attract attention! A boy was assigned to watch and control the patient, and Dick's eccentric and very rough usage of his injured limb played havoc with the nerves of the nurse. The plaster jacket was finally removed, and the chimpanzee discharged as cured. About ten days later "Dick" was again in trouble, presumably from pounding with his feet against a metal door. This time a femur was dislocated. "Dick" is once more out of the hospital, but his impatience is far from being cured.

Colonizing the Fox Squirrel.-Two species of squirrels are now at liberty in the Park. Fraternizing with the grays are twelve fox squirrels. The latter may be immediately recognized by their darker-gray coats and their distinctly yellowish underparts. They are also somewhat larger than the gray squirrels. The fox squirrels came from southwestern Pennsylvania, and by way of introduction to the Park were kept about two months in a large cage outside the Small-Mammal House, before they were set free. When first liberated they frequented the vicinity of their cage, and were daily fed by the keepers. Having noted the friendly relations between our visitors. and the gray squirrels, the members of the larger species have evidently made up their minds to make themselves at home. They have scattered over the southern portion of the Park, and thus far have appeared to be quite friendly with the members of our large colony of gray squirrels.



AN EXPERIMENT IN ACCLIMATIZATION.

In the Antelope House,—their temporary quarters for several years past,—our zebras have not bred freely, nor have any of the colts lived to maturity. Being desirous of breeding zebras, this result was far from satisfactory.

In course of time, our first pair of Grant zebras, (Equus burchelli granti), passed away; and with the purchase of a new pair, we decided to carry out the experiment we had for some time desired to make with a zebra species.

Owing to the nature of the Antelope House, all the inmates of that building are in winter housed in an artificially warmed atmosphere. The temperature is kept as low as the exigencies of two very valuable giraffes will permit; but for all that, the air lacks the crisp and invigorating quality of outdoors.

Two years ago, a new and physically perfect pair of Grant zebras was installed in the large Fallow Deer Range, near the southeastern corner of the Zoological Park, with the freedom of an eight-acre meadow. For shelter the zebras were given a roomy shed of two rooms, one of which serves as a sort of vestibule to an inner room having no outside door. The skylights and windows are ample, and in cold weather the temperature of the inner room is favorably affected by the sunlight, and by the bodies of the zebras themselves. In the severest weather of winter, the animals are confined in their inner room, and two doors are shut against the cold; but there is no artificial heat in the shed.

On July 17 the pair of zebras gave signs of having become acclimatized. A fine, vigorous colt was born, which when only two weeks old was seen to become peevish, and vigorously kick its own father, with both hind feet.

Our Zebra House is well started; but even when it is finished, the experiment described above will be continued without interruption. In fact, we are looking forward to the time when a real herd of Grant zebras will be the first sight to greet incoming visitors as they climb the steps from the West Farms Entrance.

W. T. H.

PREPARED BY THE ASSISTANT DIRECTOR OF THE AQUARIUM.

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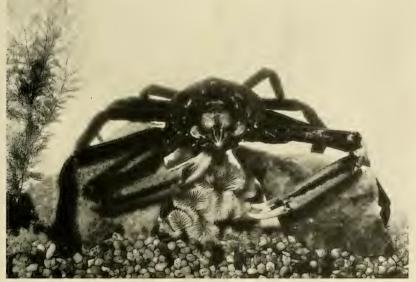
THE SPIDER CRAB.

F all the weird creatures that make their home at the bottom of the sea, perhaps none is more extraordinary than the spider crab. The spine-covered body, the extremely long appendages, the movements, slow to the limit of deliberation, and, above all, the habit of decorating its body and sometimes its limbs as well with all sorts of odds and ends of material for the purpose of concealment, render it as interesting an object for study as could well be found.

They range in size from tiny forms to the giant Japanese deep sea crab with a spread of legs reaching as much as twelve feet—by far the largest of the crustaceans. Spider crabs occur

all over the world in both cold and warm seas and from the shore line to great depths. Naturally, with such a wide distribution there are many genera and species, and several of these are found in our own region.

The commonest species of our coast are the well known large brown ones, constituting the two species of the genus Libinia (L. emarginata and L. dubia), probably not distinguished as separate by the ordinary observer though there is a difference in the number of spines on the carapace. These crabs are unable to swim except in the larval stage, and in walking they raise themselves upon their awkward-looking legs after the manner of gigantic daddy long-legs and



SPIDER CRAB, Libinia sp.

amble slowly along in a most awkward fashion. If they are ever in a hurry they never give any indication of it by accelerated movements. They are even too slow to fight except with each other, and they appear to be always good friends among themselves.

Our Libinias attain a size of about eighteen inches across the extended legs, with a body a little larger than one's fist. The eggs, which are carried as in the lobster attached to the swimmerets beneath the abdomen, are not as large as the head of a pin, and adult size is apparently not reached for several years and after undergoing numerous moults. In the moulting process the old shell ruptures around the rear margin of the carapace and the soft-shelled occupant backs out of the split thus formed. In a few hours it has absorbed an enormous amount of water and has swelled until it is much larger than it was before. In this condition it begins the secretion of a new shell, within which it continues to grow until all the spaces have been filled, when it must moult again if it is to grow further. This moulting process at first goes on quite rapidly, occurring every few weeks in the very young, but this gradually slows down to perhaps only once a year as the adult condition is reached.

The decorating instinct, which has for its purpose the protection of the crab by rendering it inconspicuous in its surroundings, is highly developed in the spider crabs. This instinct gradually wears away in Libinia as it approaches maturity, probably because the animal reaches a size in which the strongly calcified, spiny shell is sufficient protection. Numerous investigators have studied this question in various sorts of spider crabs, but perhaps the most thorough studies have been those of Dr. R. Minkiewicz on species of Maja occurring on the coast of France.

The method of attaching the decorative material to the small recurved or hooked processes on the carapace and legs is described by Dr. Minkiewicz as follows: "Having found an alga, the crab seizes it with its long slender claws, puts it first into its mouth, and while holding it with its maxillipeds, begins to tear it to pieces with its two claws. When a piece has been cut off, the crab pushes it with one of its claws between its maxillipeds and whirls it around several times. After having rumpled it, it takes it again with one of its claws, extends the claw forward as far as possible, and, after making a rotary motion bends it around over its back and proceeds to affix the alga upon a group of dorsal hooks, moving the claw slightly back and forth until the alga hooks on."

Instead of algae various other things may be used. The writer has observed spider crabs with hydroids, bryozoa, sponges, ascidians, etc., and if living organisms are not available they will make use of anything within reach that can be utilized—in the aquarium they will use pieces of paper, cloth, string, etc. These may be attached to the limbs as well as upon the carapace, until the crab may be entirely obscured beneath the mass.

Dr. Minkiewicz finds that Maja rigidly selects in relation to the environment. "If the walls (of the aquarium in use in the experiment) are white they will be covered with white only; they will take neither green nor yellow nor black; if the walls are green, they will be clothed only in green." Furthermore, when these crabs are clothed in one color they habitually seek concealment in an environment of the same color. An experiment to prove this was made by preparing an aquarium the two ends of which were of different colors. "The crabs are invariably seen to make their way toward the half of the aquarium corresponding in color to their covering. Thus, for example, in the aquarium red-green, the red crabs go to the red end, the green crabs toward the green one."

It is interesting to note that the instinct is not connected with sight except so far as the selection of colors is concerned. This was easily proved by blinding the crabs by cutting the optic nerves. After this operation "they disguise themselves at once and in quite a normal manner without, however, any reference to the color of the surroundings." Even after the removal of the brain the instinct persists, and, "if the crab happens to touch with its claws a piece of paper or alga, it is often seen to disguise itself, executing the whole series of movements without omitting any, and in the same order as when in the normal condition."

This instinct for decoration parallels in a very interesting manner the color protection observed in certain fishes (see, for example, the interesting experiments described by Dr. F. B. Summer in the Bulletin for November, 1910, though the means as well as the mechanism involved are totally different.

The spider crabs are scavengers and are not used for food, though they may be used as bait. They are frequently taken in lobster-pots where they make themselves a nuisance to the lobster fishermen by devouring the bait. The writer recalls seeing more than a hundred *Libinias* taken from two lobster-pots set overnight in Buzzards Bay by Mr. Vinal Edwards, the veteran collector of the Woods Hole Fisheries Station.

R. C. OSBURN.



SEINING KENSICO LAKE. Photograph by L. M. Petry.

THE LOCUST LOBSTER.

ERHAPS the most interesting member of the crustacea to be shown at the Aquarium is the Locust Lobster (Scyllarides aequinoctialis), also known as Spanish Lobster, Sea Roach and Mother Lobster. This peculiar form occurs in Bermuda and Florida and throughout the West Indies. It reaches a large size, the female sometimes attaining a length of three feet. The meat is edible and is said to be superior even to that of the common lobster.

Like the spiny lobster it has no large pincers and so is unable to defend itself, relying on its hard shell and secretive habits for protection. It is taken in traps and is also speared in its lurking places about the reefs.

KENSICO LAKE BASS.

LL of the lakes of the Croton water system contain fish in considerable numbers and of various species, and are the resort of numerous anglers.

When Kensico Lake, near Valhalla, New York, was drained in September the enthusiastic anglers of the surrounding country purposed to transfer the fish to nearby lakes, and, by private subscription, purchased a seine. Owing to inexperience in hauling nets and in handling live fish the venture was not very successful, and the same amount of money invested in fry would no doubt have brought more satisfactory results.

The Aquarium had made arrangements with the game warden to secure some of the fish for exhibition purposes, but was able to obtain only a few vellow perch and black bass. The largest bass taken measured nineteen inches in length and was estimated by the sportsmen present to weigh about seven pounds, while the newspaper reporters raised this a couple of pounds more. thus making a very respectable fish for a small-mouth bass. Subsequent proceedings, however, proved that

this fish had unusual capacity for shrinkage for it died that night and when weighed tipped the beam at four and one one-quarter pounds!

A hook was found imbedded in the upper jaw of this fish as was also the case with another large bass which we were unable to procure. C. G.

NEW BERMUDA EXHIBITS.

MONG the collections brought from Bermuda during the muda during the past summer are three species of strikingly colored small fishes which have not previously been seen at the Aquarium. Two of these belong in the genus Iridio in the family of Wrasse-fishes (Labridae) and are thus related to our local Tautog and Cunner. They are so different from these fishes in appearance and habits, however, that the casual observer would perceive no ground for relationship. There are now on exhibition in the same tank specimens of the Doncella or pudding-wife (Iridio radiatus), the Slippery





PORTO RICO HAWKSBILL

Dick (Iridio bivittatus) with the closely related and gorgeously colored Blue-Head (Chlorichthys bifasciatus), all of which have been exhibited in former years, as well as the Kelpfish (Iridio meyeri) and Rosefish (Iridio garnoti) which are here for the first time.

All of these fishes have the peculiar and interesting habit of secreting themselves at night either in crannies in the rock-work or by burying themselves in the loose gravel in the bottom of the tank, so that the tank which is rendered lively all day by their active forms and striking colors becomes at nightfall apparently entirely deserted. When frightened or disturbed during the day they secrete themselves in the same manner. Mr. Mowbray, who collected them, informs us that this is their custom in their natural habitat where they bury themselves in the loose coral sand. In adaptation to this habit the body is lanceolate in form, the head pointed and the fins low. It is also interesting to note that this secreting habit is regulated by such a constitutional periodicity that it is not affected by throwing on artificial light, as they rarely appear after nightfall even when the tank is illuminated by strong electric light.

The other new Bermuda fish, known locally in the Bermudas as the Butter Hamlet, is a Vaca (Hypoplectrus puella), belonging to the family Serranidae or Sea-basses. It is probably only a color variety of H. unicolor, which is known to possess an enormous range of color variation.

R. C. O.

KEY WEST RECORD TURTLES.

THE Aquarium has long had a standing order with a Key West dealer to procure the first really large green turtle that should come to market, but it was not until July of this year when the writer was in Key West collecting tropical fishes for the Aquarium that the desired specimen came. Two negro fishermen found a pair mating in the water and struck both with spears, but the male which was the smaller of the two made his escape by breaking away. The female was captured however, and being too large to spansail, her flippers were securely tied together and she was brought to port resting on her back. In spansailing a turtle a small hole is punched through the gristle near the end of the flippers which are then tied. a fore to a hind of the same side or diagonally. This is by far the most merciful way to carry turtles and indeed the only practical one, for if the flippers are left free they will be frayed by the turtle slapping everything within reach in its efforts to turn over and it will also injure nearby turtles. When carried right side up a large turtle will soon smother to death as its whole weight presses on the flexible plastron and breathing becomes impossible. The only objection to carrying a turtle on its back is that in a large specimen the eyes protrude somewhat, but if kept moist they remain uninjured when the turtle is righted. A bandage around the head answers the same purpose.

This specimen attracted much attention the first day while it lay on the dock over the turtle crawl of the unique turtle-soup cannery at Key West. It was agreed that this was the largest green turtle that had been taken for eighteen or twenty years and that although some of the turtles of the olden time had been somewhat longer none had ever been seen that was so thick through.



GIANT GREEN TURTLE.

A telegram was sent the Aquarium for instructions to buy, but the answer came after it had been sold to two young men who were going to embark in the show business, so they hired a tent on the main street near the amusement grounds and exhibited it during the Fourth of July-the turtle was captured on the first. Unfortunately Key West had seen about all it wanted of the turtle for nothing, so the show business was forgotten and the turtle purchased for the Aquarium. It was carefully doctored -all its wounds were disinfected and covered with collodion, its eyes washed with boracic acid solution, and it was laced into a rope net padded with sacks of sponge clippings to keep it moist in its upright position. Its weight smothered it however, as all the old turtlers had predicted, when it had been but twenty-four hours in this position on the way to New York.

It is a pity that its exact weight will remain unknown since it had to be cleaned and salted aboard the Comal in order to preserve it for the American Museum of Natural History. It is safe to say that it weighed not less than seven hundred pounds, however. Its upper shell measured four feet five inches and that of the largest green turtle in the Aquarium measures only three feet ten inches. It is being used as a model from which plaster casts are being made at the Museum, one of which will soon be

on exhibition at the Aquarium.

A turtle crawl is not a hauling-out place as might be expected, but a stockade of palm trunks in about five feet of water-the word comes from the Spanish corral, an enclosure. The green turtles are kept separate from the dangerous loggerheads. When a green turtle is wanted, a man gets into the crawl, which is generally the whole space under a dock and places a noose around each fore flipper and then two men on the dock draw the turtle up through a manhole. It is then weighed and the weight and consignee's name written on the plastron with indelible pencil. It is then pinioned fore and aft and is ready for shipment. Handling a loggerhead is a different process for no one will enter the crawl, so the turtles are drawn to the surface with boat hooks and noosed by the fore flippers and they are then hauled onto the dock from their open crawl. They are not passive like the greens but bite at the boat hooks with their formidable jaws. They are weighed and pinioned diagonally and their inferior meat is then for sale. A loggerhead is identifiable at a distance by the warm glow of its reddish skin whereas a green turtle looks pale or white.

All the marine turtles lay their eggs in the sand of the beach to the number of about a hundred and twenty-five and the hunters find the nests and dig out the eggs, or else find the turtle at the nest and turn her if she is not too large, otherwise they dig a trench beside her and tilt her into it, or if this fails and she starts for the water the hunter grasps her by the head and thrusting his fingers into her eyes, guides her any place he chooses—to where he can reach a rope if possible and with this fastened to a flipper a small bush is sufficient to tether a green. A loggerhead (so named on account of its large head) cannot be handled this way for its jaws are strong enough to crush a heavy conch shell to get at the snail and it does not hesitate to use them in self defense. The vegetarian diet of the green is a good index of its inoffensiveness. Once in a while a green or hawkshill turtle is caught on hook and line and is landed without much difficulty. Lately schooners have been fitted out to take turtles at sea, where they are pegged with a spear or taken in a bully, a long handled net. These catches yield a majority of males because the years of turning the female turtles which crawl onto the beach to lay their eggs has put them greatly in the minority. The male turtles are easily distinguishable by their long tails.

The same week that the large green turtle was taken saw the capture of an exceptionally large hawksbill turtle (Chelonia imbricata) by a sponge fisher. This picturesque young conch. as the natives are called, came to Key West with his well smack loaded with live conchs for the holiday market and the hawksbill, which he caught on hook and line, swimming in the well above the shells. The tortoise shell on this turtle would be worth about thirty dollars at five dollars a pound in the open market and the meat which is very highly prized would bring about fifteen dollars, and if she bore eggs about double that amount, but the theory of the turtlers is that a turtle bearing eggs will not eat, so the probability was that this female did not have eggs since she took bait and that therefore she would live in the Aquarium. This perhaps is the largest specimen of Atlantic hawksbill ever measured and weighed of which we have any record, as she was thirty-eight and a half by thirty-four and a half inches measured over the curves and weighed one hundred and eightyeight pounds. Last April we received what up to June was the largest hawksbill ever seen at the Aquarium, a specimen weighing one hundred and twenty-four pounds and measuring thirtythree and a half by thirty-one inches over the curves. She was taken on the beach at Porto Rico and loaned to the Aquarium by Mr. Parker. Both of these turtles refused food and in-



HORSESHOE CRAB.

deed we have lost four for this reason within the last year. These specimens are larger than the Pacific hawkshills (Chelonia squamata) recently brought from La paz, Lower California, by Dr. C. H. Townsend for the American Museum of Natural History. which measured along the top shell thirty-four inches and thirty-one inches respectivelv. Small hawksbills do very well in the Aquarium. We are very much indebted to Mr.

Mallory of the Mallory Steamship Company for cooperation in transporting our turtles and tropical fishes from Key West, Florida. Without his help we would have been unable to transport fishes so far and the Aquarium would be without many fishes heretofore not exhibited. CHAPMAN GRANT.

ELEPHANT SEALS.

THE six young Elephant Seals (Macrorhinus augustirostris) received at the Aquarium from Guadalupe Island off Lower California, on March 13, are still on exhibition and are apparently in excellent condition. Since the death of the Alaska fur seals, they have been separated to give them more room and now occupy two of the large floor pools. For some time after these animals were received they did not eat readily and took only a small amount of food, although every effort was made to tempt their appetites. In the course of a little time, however, they all found appetites commensurate with their size and at present they consume about twelve to fifteen pounds of food each per day. They are fed on cod and herring with an occasional change to haddock and weakfish. Some of them have learned by their own initiative to squirt mouthfuls of water for a short distance and to juggle the wooden ball floating in the pool.

Two of these seals have been presented to the United States Bureau of Fisheries to which the New York Zoological Society is indebted in many ways for specimens and other aid in keeping up the Aquarium exhibits.

The Bureau of Fisheries will place these specimens in the National Zoological Park at Washington and they will be sent on as soon as suitable quarters can be provided for them. This will permit us to place the remaining four seals in one pool without detriment to their health. R. C. O.

AN UNUSUAL HORSESHOE CRAR

BNORMALITIES in the appendages of crabs are not uncommon and a number of cases of partial division of the caudal spine of the Horseshoe or King Crab (Limulus polyphemus) have been noted. The accompanying picture illustrates the most complete as well as the most symmetrical case of this abnormality of which we have any knowledge. The specimen from which the photograph was taken was a full grown one received at the Aquarium in July from an unknown donor in Port Jefferson, Long Island. It lived for several weeks in one of our exhibition tanks and attracted much attention among visitors.

R. C. OSBURN.

GOITRE IN FISHES.

T has been a common experience in fish hatcheries devoted to the culture of trout and other salmonoid fishes that many of the fishes hatched and reared in captivity develop tumors in the throat region. These have been commonly referred to as goitres or as cancers. Scare headlines have appeared in some of the newspapers suggesting that cancer may be acquired in the human through the medium of a fish diet. Of course there is nothing whatever in such a suggestion even though cancers occasionally occur in fishes.

The tissues of the thyroid gland, which are affected in goitre, have also been occasionally found to contain cancerous growths. As so little is known concerning the cause and developmen of cancer the pathologists have welcomed the opportunity to study the abundant material supplied by the numerous cases of fish goitre in the hatcheries devoted to the salmonoid fishes.

While as yet nothing has appeared to throw any light on the cancer question the investigations carried out on these thyroid tumors have proved of great interest in other ways. Doctors Marine and Lenhart of the medical department of the Western Reserve University of Cleveland, Ohio, have been working in connection with the Pennsylvania Commission of Fsheries and have thus far published two bulletins (Nos. 7 and 8, Dept. of Fisheries, Harrisburg, Pa.) setting forth the following results:

The swellings or tumors of the throat region of the trout are due to hypertrophy of the thyroid glands and are thus true goitres similar to those of the human. That they are of the same nature is shown both by their histological structure and by the fact that they yield to exactly the same treatment, viz., the iodine method.

They show no indication of a direct connection with cancer, and, while carcinoma or cancerous tissue may occur in these goitreous tryroids, such a condition is no more common than in human goitre.

There is no evidence that this goitre is either infectious or contagious. Even experiments in transplanting the diseased thyroid tissues to healthy fishes gave only negative results.

Fish goitre is quantitatively related in severity to the general hygienic conditions, food, water supply and crowding of the hatchery.

The ultimate cause of the goitre is unknown but in all probability it is due to disproportion or lack of certain elements necessary for nutrition.

The food supplied to young carnivorous fishes in hatcheries consist ordinarily of finely ground liver, heart and lung tissues from cattle, hogs and sheep. This diet evidently may influence the health of the fish in at least four ways, as follows:

a. It is a highly unnatural food,

b. It is frequently fed in excessive amounts.

 It contains an excess of certain elements and a deficiency of others necessary for normal nutrition,

d. By bacterial decomposition.

These researches have thus shown us that the throat tumors of the trouts and salmons are merely goitres and that they are not directly connected with cancers. Furthermore they have suggested the means of preventing the disease by controlling the food and improving the sanitation of the hatcheries. Certain of the suggestions of Doctors Marine and Lenhart are already being tried out in the Pennsylvania State Fish Hatcheries. This is another excellent example of the way in which results obtained by investigation and experiment in the field of pure science may be put to practical use.

R. C. OSBURN.

AQUARIUM CENSUS.

A RECENT census of the fishes in the Aquarium shows that there are now on exhibition one hundred and twenty-six species.

Tropical fishes from Bermuda

and Key West59 species.

As soon as colder weather arrives the list of local salt water fishes will be increased by about a dozen species that do not live in this vicinity in summer but which are regular winter residents. Our collection of fresh water fishes is not as large as it has been at times.

The fresh water turtles at present number fifteen species, besides which we have the green, hawksbill and loggerhead turtles as representatives of the marine species. The sea turtles are fed regularly on cod-fish cut into pieces and in addition they are given once a week a bushel of eel-grass and sea lettuce which they devour with avidity. One of the green turtles has been in the Aquarium over fourteen years.

Of invertebrates there are on exhibition about thirty-five species, about half of which are crustaceans. Repeated attempts have been made during the summer to bring the octopus alive to the Aquarium but all efforts have resulted in failure.

MORE FLORIDA FISHES FOR THE AQUARIUM.

THROUGH the courtesy of Mr. Clifford Mallory of the Mallory Steamship Company, the Aquarium has lately had the privilege of special facilities in the shipment of fishes from Key West, Florida. Two large collections have been received since July on the Steamer Comal, both of them containing tropical species new to the exhibits at the Aquarium.

There are serious difficulties in the way of transporting live fishes by sea, which can only be surmounted by the co-operation of the officers of the steamship companies and of the vessels. The assistance of Mr. Mallory and the officers of the Comal has meant good fortune for the Aquarium.

The exhibits of tropical fishes are now finer than at any time in the history of the institution. The collection received on October 17 is the gift of Mr. Danforth Ferguson of Halesite, Suffolk Co., Long Island, N. Y., who also assisted in obtaining the specimens at Key West. The Zoological Society is much indebted to Mr. Ferguson for his friendly interest in the Aquarium. Both expeditions were in charge of Mr. Chapman Grant of the Aquarium staff. C. H. T.

ZOOLOGICAL SOCIETY BULLETIN.

ELWIN R. SANBORN, Editor.

Aenartmenta:

Mammal W. T. Hornaday. Reptile RAYMOND L. DITMARS.

Aquarium
C. H. Townsend.
RAYMOND C. OSBURN, Ph. D.

Bird C. William Beebe. Lee S. Crandall.

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HOW FISHES BREATHE.

Respiration is, of course, necessary to every organism, plant or animal, that is to say, oxygen is required for the combustion of the food materials and by this process the organism releases the energy necessary to the activities of protoplasm. Animals vary widely in the amount of oxygen required to maintain life. Since the constant high temperature of the warm blooded animals requires a great amount of combustion, the birds and mammals consume more oxygen than cold blooded forms. The reptiles and amphibians of the temperate regions of the world hibernate during the winter and during this season of inactivity respiration is greatly lowered. Many species of fishes also hibernate during the colder months, some forms burying themselves in the mud.

Air breathing animals find a ready supply of oxygen in the air from which they absorb it into the blood through the lungs, or as in the amphibians, partly by means of the thin, moist skin. Animals living in the water have an equally constant, but much less abundant supply of oxygen to draw upon, since water will absorb only a small proportion of this gas. Numerous groups of air breathing animals are, of course, able to live in the water by coming to the surface occasionally to breathe.

Many of the lower groups of invertebrates present a sufficiently large proportion of body surface to the water so that no special organs for the absorption of oxygen are necessary, e. g. protozoa, hydroids, jellyfishes, corals and most worms. Others, such as the tube-dwelling worms and the molluscus and crustaceans which are encased in hard coverings, have evolved special expansions of the body, the gills, for respiratory purposes. In some cases these gills are freely exposed to the water but in most crustaceans and molluscs the water is caused to flow through special chambers containing the gills.

The vertebrates have evolved a gill mechanism which is so characteristic of the group that it is found not only in the lowest orders, acorn worms, ascidians and amphioxus, but also in the embryonic stages of reptiles, birds and mammals where they are never functional as breathing organs. This apparatus consists of a series of slits or apertures through the body wall leading from the pharynx to the outside. In respiration the water is taken into the mouth and forced out through these slits, coming into close relation with the blood in the walls of the gills. In the acorn worms and amphioxus the gill slits are very numerous, but as efficiency becomes greater the number is reduced. In the lampreys the number varies from seven to fourteen. In the

true fishes the highest number is seven, found only in the lowest sharks, while the characteristic number is five.

The gill of the fish consists of a cartilaginous or bony support, the gill arch, on the outer side of which are arranged the numerous, delicate, thin-walled gill filaments. It is in these filaments that the absorption of the oxygen from the water into the blood takes place. The blood flows directly from the heart to the gills by the afferent arteries, one to each gill, and thence passes into very fine vessels in the filaments which have such delicate walls that the blood is brought close to the surface. As the filaments are very numerous a large surface is exposed to the water. After passing through the filaments the blood is taken up by the efferent vessels and thence to the systemic circulation.

In order to cause the water to flow over the gills certain accessory organs are necessarily involved. These are the mouth, oral valve, pharynx, and the gill slits. To prevent food matter from passing out through the gill slits these openings are guarded by the gill-rakers, projections from the inner surface of the gill arch. For the protection of the delicate gills externally the opercular apparatus or gill-flap has been evolved. This ordinarily consists of a series of flat bony plates hinged in such a manner as to allow the water to flow out readily after passing over the gills but closing at once to prevent any injury from the outside. In the sharks there is no such arrangement, each gill slit opening separately to the outside. In the morays the bony plates are reduced and the covering consists mostly of skin.

The sequence of the breathing movements is as follows: The fish takes in a mouthful of water, closes the mouth or the oral valve, and forces the water backward by muscular action into the pharynx where it passes through the gill slits (the gullet being closed) and over the gill filaments. The water, exhausted of its oxygen, then passes from the gill chamber to the outside by pushing aside the opercular flap. These breathing movements follow each other rhythmically, the rhythm varying according to conditions. Fishes which do not have the oral valve-a fold of skin within the mouth-well developed must needs close the mouth with each respiration, and this is why certain fishes, when caught on a hook in such a manner as to prevent the mouth being closed, can be drowned.

A few fishes have developed special structures which permit them to breath while out of the water. Thus the climbing perch (Anabas scandens) of India has a special modification of the gills and gill chamber for air breathing.

The lung-fishes have a very vascular air bladder, which is homologous with the lungs of airbreathing vertebrates, and are thus able to breathe air. They inhabit marshes in the tropical regions of Australia, Africa and South America, where at certain seasons of the year the water dries up. They are in a dormant condition during this season, however, and only become active with the advent of the rainy season, when the normal gill respiration is resumed to furnish them with more oxygen than can be obtained by the imperfect swim-bladder lung.

R. C. OSBURN.

OCEANIC BONITA AND LITTLE TUNNY.

Two specimens of the Mackerel family recently brought to the Aquarium for identification deserve mention for the sake of recording their occurrence in this vicinity. These represent the two species of the genus *Gymnosarda* which are found the world around in warmer seas.

For one of the species Gymnosarda pelamys, the Oceanic Bonita, there is no local record available and it is not listed in the New Jersey Reports. Bean, in his Fishes of New York, mentions it as a "rare visitor in our waters." The other species is the Little Tunny, sometimes miscalled Albacore (Gymnosarda alleterata). This fish is listed in both the New York and New Jersey reports but no records are given for its actual occurrence in either state.

For the pleasure of examining these specimens we are indebted to Mr. Archibald B. Gwathmey of New York City, who took them with rod and reel five miles off Manasquan, New Jersey, September 10, 1911. Mr. Gwathmey states that they occurred in large schools.

APPEAL FOR NEW MEMBERS.

The Executive Committee will welcome the suggestion of new members, and a blank is enclosed for this purpose.

The Society is obliged to rely on the dues of members as its chief source of income for the general purposes of the Society, not only for the collections at the Park and the Aquarium, but for the establishment of the new library, and above all, for the game protective work of the Society.

The Executive Committee wishes to render substantial aid, during the coming year, to the general cause of the conservation of the wild life of the country, and is at present without funds for this purpose. On a membership strong in character and in numbers depends not only the influence of the Society, but in a large measure its financial strength.



BROAD NOSED CROCODILE.

AQUARIUM NOTES.

Striped Bass.—There still remain at the Aquarium two specimens of Striped Bass (Roccus lineatus) which were brought in for exhibition May 14, 1894. As they were two years old when taken, these specimens, if they live until next spring, will be twenty years old.

Wandering Trunk Fish.—The capture of a trunk fish, presumably (Lactophrys trigonnus) in great South Bay, Long Island, in August, 1911, is reported by Miss Eleanor D. Wood, of Islip, Long Island. This tropical species occasionally strays as far north in summer as Southern Massachusetts.

C. H. T.

Night Opening at the Aquarium.—Beginning with May 30, the Aquarium was kept open to the public until ten o'clock at night through the summer months until September 30. The average nightly attendance after the usual closing hour was 1,395 and the largest attendance on any one night was that of June 4, when 6,934 persons viewed the exhibits.

Transplanting Turtles.—In the summer of 1909 I liberated three pairs of Blanding's Turtle (Emys blandingi) and three pairs of the Map Turtle (Malacoclemmys geographica) in southern Orange County, New York. As some of these turtles or their progeny may eventually fall into the hands of naturalists, it is desirable that a record be made of their introduction. All of the specimens were placed at Little Long

Pond, near Southfields and all were collected in Eric County, Ohio.

C. H. T.

Local Tuna Fishing.—In the Bulletin for November, 1910, mention was made of the fact that the Great Tuna (Thunnus thynnus) had been captured a number of times with rod and reel at Barnegat, New Jersey. We are pleased to note that this was no sporadic occurrence of this king of game fishes as a number of captures have been made again this season. Two of these, as reported by Mr. Hartie I. Phillips in Forest and Stream for October 7, were taken from the beach while casting for channel bass.

Cobia or Crab-eater.—A small specimen of this fish (Rachycentron canadus), about six inches long, was taken on a hook by Mr. B. F. Garrison of New York City in Goose Creek, Jamaica Bay, Long Island, on August 27, 1911, while fishing for kingfish. The species reaches a length of five feet and ranges in warm seas around the world. As Jordan and Evermann remark the species was "named for Canada where it does not occur." It is rare in this locality though it has been taken as far north as Massachusetts Bay, and there is no previous local record of a small specimen. R. C. O.

Additional Key West Specimens.—Mr. Danforth B. Ferguson's generous gift of Key West fishes to the Aquarium has been noted elsewhere. In this collection there are five species of fishes not previously exhibited here. These are; the Scamp (Mycteroperca phenax) one of

the Groupers; the Snook or Robalo (Centropomis undecimalis); the Southern Puffer (Sphaeroides spengleri) or swell-fish, and Scorpion and Toad Fishes. New additions of invertebrates in the same collections are four species of Conchs, green hermit crab, spider crab, starfish, blunt-spined sea-urchin and a basketstar.

The California Sea Lion.—The sea lion which has spent four years in the Aquarium began during the past summer to show unmistakable signs of the enlargement or crest on the top of the head, so characteristic of old males of this species. Allen (North American Pinnipeds) says in regard to this matter, "the sagittal crest, in very old males, forms a remarkably high, thin, bony plate, unparalleled in its great development in any other genus of the family

of Professor Charles B. Davenport, Director of the Carnegie Laboratory at Cold Spring Harbor, Long Island. The Short Big-eye, as this fish is also called, is a resident of deeper waters of the West Indies, but the young occasionally drift northward in the Gulf Stream. A number of specimens have been taken about Woods Hole, Massachusetts, and one is recorded from as far north as Marblehead, Massachusetts. One specimen is known from New Jersey at Atlantic City, and as far as known the present record is the first for the State of New York. The entire body of the fish is brilliantly red. and the fins, except the pectoral, are tipped with black. The large eye is exceptionally beautiful and glows like molten gold. The little fellow, which is about two inches long, was placed in a tank with the sea horses where he feeds voraciously on the small crustacea which also constitute the diet of the sea horses.



IEWFISH.

(Otariidae) and, contrary to what usually obtains in the other genera of this family, is considerably developed in very old females."

According to the best information obtainable this sea lion is now between six and seven years of age, as at the time of his arrival at the Aquarium in October, 1907, he was said to be past two years old. From this we may judge that the sea lion attains full maturity at about the same age as the fur seal which is known to reach sufficient size to fight for and maintain a harem at seven years.

R. C. O.

The Redfish.—A most interesting little fish, exhibited for the first time at the Aquarium, is a young specimen of Pseudopriacanthus altus received August 17, 1911, through the kindness

KEY WEST FISHES AT THE AQUARIUM.

WHILE it is a well known fact that localities similarly situated as to latitude and environment are likely in general to have similar faunas, it is equally true that such localities if separated by a considerable distance may present interesting differences in the minor details of their faunas. Thus a species which is common in one locality may often be represented in a similar locality by another species of the same genus or even by some other genus which parallels it in appearance by reason of similar habits of life.

In past years all of our tropical fishes have been obtained from Bermuda, but this past summer Mr. Chapman Grant of the Aquarium staff made a special trip to Key West to supplement



BLACK MARGATE.

our exhibits by a collection from that region. Mr. Grant succeeded in obtaining and bringing back alive on July 11 thirty-seven species of fishes and six species of large crustaceans and molluscus, besides the largs hawksbill turtle described elsewhere in this Bulletin. In all there were one hundred and eighty-four specimens belonging to forty-four species, nine of which had not previously been exhibited at the Aquarium, besides a number of others heretofore rare in our collections.

The six species of fishes not heretofore exhibited at the Aquarium are the Black Angelfish, French or Black Margate, Porkfish, Ocean Turbot or Triggerfish, Horse-eye Jack and Rock Hind.

Black Angelfish (Pomacanthus arcuatus). This fish, known also as the Chirivita or Portugais, is as beautiful a creature as ever wore

the modest colors of pearl, gray and black. Each scale is dark with an edging of pearl and there are no bright colors, except a touch of vellow on the pectoral and the tips of the ventral fins. The young are crossbanded with white but these bands soon disappear. It is a common species in tropical seas of America and reaches a length of one and one-half to two feet. The most northerly record of the species is that of a specimen, figured by Jordan and Evermann, taken at Barnegat, New Jersey. This specimen was so far out of its usual range that it was probably a wanderer from the Gulf Stream. Eleven specimens were brought to the Aquarium where they are doing well and where they make a striking exhibit.

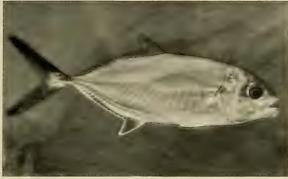
Pompon: Black or French Margate (Anisotremus surinamensis). This member of the Grunt family (Haemulidae) is represented for the first time at the Aquarium by two handsome specimens. Like the preceding species the coloration is limited to black and light gray, with

the black at the base of each scale, but the black is especially heavy on the anterior half of the body, back of the head, where it forms a broad girdle. The pigment of this girdle is under the control of the nervous system so that at one time the black may appear very intense and the next moment may almost entirely disappear. The Pompon grows to a length of two to three feet. It is the most widely distributed and largest species of the genus and is found from Florida to Brazil and also on the Pacific coast, if the ichthyologists are correct in their belief that the Lower California species is identical with this.

The Porkfish or Catalineta (Anisotremus virginicus) is closely related to the preceding species, but its coloration is so gaudy and striking that if color were an important character they could have but little relationship.



GRASS PORGY.



RUNNER.

The ground color of the Porkfish is bright golden. Across this a broad bar of a jet black extends diagonally from the nape across the eye, and another encircles the body vertically behind the gills. Behind this the color pattern changes abruptly and narrow dark bars run horizontally to the tail. All the fins are deep yellow. The species ranges from Brazil to Florida.

In naming the species Linnaeus was mistaken as to the natural range of the porkfish, for it does not extend as far north as Virginia. It is included in the list of the New Jersev fishes on the authority of Dr. Abbott who found a specimen in the Trenton fish market said to have come from Barnegat, but there are no positive records of the occurrence north of Florida. Of course almost any of the West Indian fishes may be swept northward in the Gulf Stream and Dr. Abbotts record is not beyond the range of possibilities. The Porkfish is the commonest of the

genus in the West Indies, and reaches a weight of two pounds. The twenty-three specimens brought to the Aquarium from Key West make a striking and beautiful display.

Lutianidae or Snappers. This family is richly represented in the West Indian region by seven genera and twenty species. Among these are the well known Red and Gray Snappers which frequently reach the northern fish markets. While none of this family is resident or regularly migrant north of Florida, a number

of the species have been noted as stragglers, having probably been carried out of their regular range in the warm waters of the Gulf Stream. Thus, at Woods Hole, Massachusetts, five species of the genus Neomaenis have been taken.

Among the fishes received from Key West the past summer were two of this genus which deserve mention. One of these, the Muttonfish (Neomaenis analis), known also as Pargo or Pargo criollo, has never before been exhibited at the

Aquarium. This fish, which is the most important food fish of the Havana market is found normally from Brazil to Florida and has been taken as far north as Woods Hole. Massachusetts, but has not been recorded for New York or New Jersey waters. It is a large species reaching a weight of twenty-five pounds. It is not so striking in its coloration as some others of the genus, but is a very handsome fish with its dark olive green background and irregular bluish stripes. The fins are mostly brick red, while the iris is fiery red giving the eyes a ferocious, gamy look. There are at present five of these at the Aquarium.

The other species, Neomaenis apodus, the Schoolmaster, has been rarely represented in our collections. Its range is about the same as that of the preceding species and it has also been taken at Woods Hole, but not in this immediate region. The Schoolmaster is one of the most



MUTTONFISH.



COMMON GRUNT.

highly colored of the Snappers, reddish brown above and orange on the sides, crossbarred, with greenish white. Walbaum described and named the species from a drawing by Catesby, who neglected to include the pectoral fins in his figure, and applied the specific name apodus, meaning, "without limbs"! Twelve specimens of this beautiful and interesting fish were brought from Kev West.

Besides the above mentioned species there are on exhibition at the Aquarium the Gray Snapper (Neomaenis griseus), the Red Snapper (N. aya) and the Lane or Red-tail snapper (N. sunagris).

The Sea Basses, Family Serranidae. This family, which includes the White, Striped and Sea basses, Hinds, Coneys, Rockfishes, Wreckfishes, Jewfishes, Groupers (from "garrupa" the Portuguese name for some of these fishes), Soap-

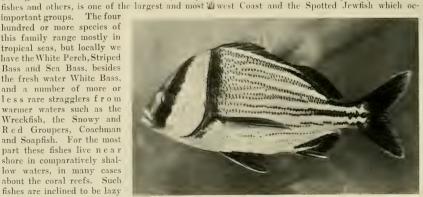
important groups. The four hundred or more species of this family range mostly in tropical seas, but locally we have the White Perch, Striped Bass and Sea Bass, besides the fresh water White Bass. and a number of more or less rare stragglers from warmer waters such as the Wreckfish, the Snowy and Red Groupers, Coachman and Soapfish. For the most part these fishes live near shore in comparatively shallow waters, in many cases about the coral reefs. Such fishes are inclined to be lazy in habit and spend much of

the time resting on the bottom. For this reason they adapt themselves to life in the Aquarium tank as though it were a natural habitat, and even the largest specimens live well though some of them are so large as to appear almost ridiculously disproportionate to their narrow quarters. At present sixteen species are represented in the collection of the Aquarium.

The Rock Hind (Epinephilus adscencionis) is on exhibition for the first time. This is a small species reaching a length of only eighteen

inches, and is one of the most beautiful members of the group. The general color is olivaceous grav with irregular small white blotches, with blackish spots on the back, and with numerous round orange-brown spots over the whole body. As in other members of the family the Rock Hind possesses considerable capacity for color changes. It is a common species from Florida Keys to Brazil and has been recorded also at St. Helena Island and at the Cape of Good Hope. Nine specimens were brought to the Aquarium from Key West.

Spotted Jewfish (Promicrops guttatus). For some unaccountable reason a number of the larger species of "groupers" occurring in warm waters are popularly known as Jewfishes. The American forms are the Black Jewfish (Garrupa nigrita) of the West Indian region and the California Jewfish (Stereolepis gigas) of the



PORKFISH.



RED-MOUTHED GRUNT: TOM TATE.

curs in both Atlantic and Pacific waters. These three are the giants among the sea basses and are among the largest bony fishes known, reaching a weight of five hundred to six hundred pounds. Two specimens of the Spotted Jewfish are now among the Aquarium exhibits. This species is able to execute some of the color changes characteristic of the group but not in such a striking manner as the Nassau Grouper and Red Grouper.

The fishes belonging in the family Carangidea, including the Pompanos, Leather Jacks, Amberfishes, Cavallas, Runners and Moonfishes, are characteristically denizens of the open seas, and nearly all have a wide distribution in tropical and sub-tropical waters, some of them ranging in summer into the temperate seas. Since they are active, strong swimmers they are usually not well adapted to a life of confinement in the Aquarium. A number of species have, how-

ever, been kept with a measure of success. Among these we are able at present to exhibit two species of Runners, the Common Jack (Caranx hippos) of both Atlantic and Pacific oceans and the Horse-eye Jack (Caranx latus) of the tropical waters of the Atlantic. The latter has not previously been seen in our collections, but two specimens were recently brought from Key West. They are remarkably trim looking fishes, showing in every line of the body their adaptation to life at the surface of the high seas

A Turbot or ocean Trigger fish, new to our collections, was also brought in with the Key West fishes. The genus is Canthidermis, but the characters on which the identification of the species rests are not evident without handling the specimen, so it has not been positively determined.

Other interesting fishes brought from Key West and which have previously been received also from Bermuda are the Jolt-head Porgy (Calamus bajonado), Grass Porgy (Calamus arctifrons), Common Grunt (Haemulon

plumieri), Tom Tate or Red-mouthed Grunt (Bathystoma rimator), Spanish Hogfish (Harpe rufa) and Butterfiy fish (Chaetodon ocellatus). R. C. OSBURN.

NOTES ON FUR SEAL IN CAPTIVITY.

The second and last of the pair of fur seal pups received on November 23, 1910, as the gift of the United States Bureau of Fisheries, died on August 6, 1911. It will be recalled that the male pup died of acute nephritis in January. After his death the little female occupied one of the large floor pools at the Aquarium by herself. She was extremely active and swam nearly all of the time, day and night, to the wonder and delight of the visitors.

Although she took but little food for several days before death and was evidently in distress,



JOLT-HEAD PORGY.



the autopsy revealed nothing that could have been the cause. Her favorite diet consisted of herring and cod cut into convenient size for swallowing. These strips were always bolted whole without any pretense of chewing, a habit entirely in accord with the dentition of the species as the teeth are purely raptorial in adaptation and are fitted only for holding and killing the slipperv prev.

Some idea of the voracity of a seal may be gained from the fact that this pup consumed ordinarily six to six and one-half pounds of fish per day, nearly or quite one-fourth of her

weight.

In spite of this amount of food she did not grow very rapidly nor lay on fat, seeming to consume it all in the energy

of her swimming move-

ments. The following table will show the rate of increase in weight during the eight and a half months that this seal

lived in the Aquarium: December 23.....23 pounds. January 23.....26 pounds. February 23 25 pounds. March 2326 pounds. April 2526½ pounds. May 2424 pounds. June 27.....27 pounds. July 25 pounds. At death25 pounds.

The last decline is probably due to the fact that but little food was taken for several days before death.

The following measurements were taken after death:

Tip of nose to tip of tail 2 feet 10 inches. Tail 2 inches. Girth 1 foot 10 inches. Length of front flipper 12 inches. Breadth of front flipper 32 inches. Length of hind flipper 12 inches. Breadth of hind flipper 5 inches.

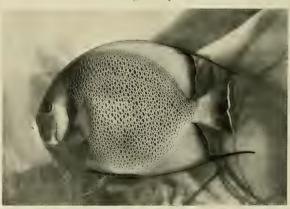
That it is not impossible to keep these seals in confinement in this latitude is shown by the fact that a pair has lived for nearly two years in the aquarium of the Bureau of Fisheries at Washington and the male and female reached a weight in July of fifty-six and

forty-one pounds respectively.

We are glad to be able to state that the Commissioner of Fisheries, Mr. George M. Bowers, has promised us another pair of the pups as soon as they can be secured from the breeding grounds on the Pribilof Islands, Alaska. R. C. O.

A LARGE JEWFISH.

RECENT addition to the Aquarium exhibits worthy of special notice is a large Spotted Jewfish (Bromicrops guttatus) weighing about 250 pounds, the gift of Mr. Danforth B. Ferguson. This is much the largest of the Groupers ever seen at the Aquarium, and the largest bony fish on exhibition.



BLACK ANGEL.

13971

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MR: MACKAY'S GREAT GIFT OF MOUNTED HEADS.

FOR three long years, the promoters of the National Collections of Heads and Horns have steadily maintained the hope that some good genius would present to that collection the commandingly fine heads of wapiti and American bison of which it sorely stood in need.

The Society has just received from Mr. Clarence H. Mackay a truly royal gift, consisting of 12 mounted heads of bull moose, from the Kenai Peninsula, Alaska.

10 mounted heads of bull elk, from Wyoming, and

 $\frac{1}{26}$ mounted heads of bull American bison.

This wonderful collection was brought together by Mr. Mackay in 1902, and in the winter of the following year the moose heads were exhibited at the establishment of C. G. Gunthers Sons. Many New York sportsmen went there to see them, and to admire.



HEADS OF ALASKA MOOSE IN THE MACKAY COLLECTION.



Each one of these heads is a prize! They were selected with great care and judgment when the Kenai moose country was wide open, and moose heads could be purchased by those who had the price. We fancy that the world never has seen another such a gathering of enormous moose heads as the Mackay collection. Here are the spread measurements of a few: 76 in., 74\frac{3}{4}, 74\frac{1}{4}, 69\frac{1}{2}, 67\frac{1}{2}, 66\frac{3}{4} and 64\frac{1}{4} inches.

Besides the splendid spread and massiveness of these antlers, they show many variations of form, and tendencies toward freakiness, which are not only interesting but of de-



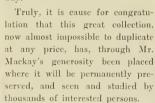
cided zoological value. No two of them are quite alike. At one end of the series is the extremely attenuated and bifurcated form of antlers, and at the other the broad, circling shovel, so cupshaped in the middle that a palmation would readily hold a quart of water. Verily, these heads were taken in the days when Giant Moose, (Alces gigas), on the Kenai were plentiful and big.

The ten wapiti heads are almost, though not quite, equal in rank and variation to the moose

heads. Each one has been selected and included for some specific reason that the good judge of antlers will readily divine. Some are very long, and others are very massive, with less length. Altogether, they make a commanding series.

Up to the time of the receipt of Mr. Mackay's gift, we had been without a single head of a bull bison from the plains. Now we have four,—two for each series. They are large, modern

in mounting, and perfect in every way.



W. T. H.



At the forty-first annual meeting of the American Fisheries Society, held in St. Louis in September, Dr. Charles H. Townsend, Director of the New York Aquarium, was elected Vice-President of the Society.

FOUR AMERICAN BISON HEADS.
Mackay Collection.



THE ENTIRE MACKAY COLLECTION OF ELK, BISON AND MOOSE HEADS.

THE REAL HEIGHT OF JUMBO.

NASMUCH as Jumbo, the great African elephant brought to America by Mr. P. T. Barnum in 1882, was probably the tallest elephant that ever lived in America, his standing height has been a question of more than passing interest. When Jumbo was shown in Washington, D. C., in 1883, the writer secured from Mr. Barnum a card of permission to measure Jumbo, "provided Mr. Bailey consents," When

that card was presented to Mr. Bailey, his indignation was as colossal as the great pachyderm. "Measure Jumbo? In-deed!"

So far as we know, Jumbo went to his death, in front of a locomotive, with his exact height unknown. Professor Ward's men measured him dead, and declared his height to be eleven feet four inches; and for twenty years the matter rested there.

Recently Mr. Robert Gilfort, of Orange, N. J.,



LARGEST MOOSE HEAD: SPREAD 76 INCHES.

Mackay Collection.

has given me Jumbo's exact standing height. In the year 1883 Mr. Gilfort was a performer in the Barnum Show, in which there was also a "pole-jumper" named Elder. The chief stage property of the jumper was the long, straight pole with which he did his leaping.

While the show was at Madison Square Garden, New York, Mr. Gilfort and his colleagues decided that they would ascertain the actual height of Jumbo. In the course of his free exercises between acts, the pole-jumper casually leaped to the side of Jumbo, and carelessly stood his pole up close beside the animal. Mr. Gilfort, being quite ready, carefully noted the point on the pole that corresponded with Jumbo's highest point at the shoulders; and when measured it proved to be ten feet nine inches.

W. T. H.

ARTIFICIAL SNAKE DENS.

I N an effort to enliven the interior of the Reptile House, we are making a trial of the modeling and painting of panoramic backgrounds in several of the serpent cages. With

this experiment we have several ideas in view. The cold and blank walls of the cage are thrown into perspective, a certain amount of atmosphere of the wilds is created, and it is possible to convey a hint of the character of ground frequented by species of importance.

Thus far our experiments have been limited to the cages for the northern or timber rattlesnakes and the copperhead snakes, which species are the only two poisonous reptiles inhabiting the northeastern portion of the United States. The scenes represent the country along the highlands of the Hudson River, where both of these species of reptiles are to be found in generous numbers.

A ledge of rock affords the rattlesnakes a chance to exercise, and leading into this ledge are various crevices which terminate with a typical den. This is a compartment two feet long by one and one-half feet wide and about a foot high. It contains a bed of dry leaves, and affords the snakes a chance to hide. The copperheads are provided in like manner. While at first we were in doubt as to the possibility of the greater number of both species of

snakes spending most of their time in their hiding quarters, we are gratified to find that there is always a fair number of them in view. Theoretically, it seems proper to give these timid creatures an opportunity to seek secluded quarters when they so desire, especially after feeding. We imagine that with these cage arrangements, our poisonous snakes will do better, and not evince the stubborn inclination to fast which is so common among venomous reptiles.

As this article goes to press, we are much disturbed to note that an epidemic has appeared among our rattlesnakes. Dr. Blair has diagnosed the trouble as being caused by a wormlike parasite which attacks the various internal organs. At present, adequate treatment seems to be impossible, and it may be that we are destined to lose all the members of our rattlesnake colony, with the result of having to wait until the coming spring to obtain a fresh supply.

We are particularly fortunate in possessing a spectacular series of copperhead snakes. These are obtained by a specialist on this species, who resides in Connecticut. He points with pride to the existence of a copperhead den on his farm, and explains that he fully protects the reptiles, with the result that a liberal number always may be obtained. From him we have received about thirty particularly large copperheads; and this lively family now occupies our latest panoramic cage.

It seems highly desirable that our visitors should be enabled to examine our two local species of poisonous reptiles amid surroundings that at least attempt to represent their natural haunts. The first impression of the copperhead is the color similarity of this reptile to fallen leaves. Difficult to distinguish, and ordinarily a silent creature, it is especially feared in the regions where it is common. On the other hand, when the rattlesnake is stretched upon rocks, owing to its velvety scales and surface, and the pitchy black of the males, or the striking sulphur hues of the females, it stands out in bold relief, and is readily seen. In addition to the vivid hues, the charcteristic rattle aids in rendering this dangerous serpent very prominent whenever it is disturbed.

It is our intention to continue the series of panoramic snake cages. When we consider backgrounds for the Indo-Malayan, African and South American species, we realize that the decorative possibilities are many and picturesque.

R. L. D.



SLEEPING PEACOCKS.
Buried under snow during night storm,

NOTES.

Storm-bound Peafowl.—The hereditary habit of the peacocks of roosting for the night in trees sometimes forces upon them considerable discomfort. After selecting a roosting place the birds return to it each night; apparently the same ones without ever deserting the site. Usually two in the same tree. After the recent heavy snow storm, Dr. Blair directed my attention to two male peafowl that had selected a big oak tree near his office window as a perching place. The snow had fallen during the night to a depth of about ten inches forming a wall on each side of the sleeping birds, which completely arched over their backs. As the heat of their bodies melted the snow, the water had gradually saturated their lighter feathers and formed a tiny coronet of ice on their heads. As we watched them they stood erect as if to learn just what the prospect of moving might be. The effort probably convinced them that to get to the ground meant to tumble and not fly, for they promptly settled down again. While they waited for the sun to dry them out, the picture was made.

Laughing Hyena.—A sound very startling to visitors comes from a cage in the Small-Mammal House, enclosing a vigorous specimen of the laughing or spotted hyena, the gift of Mr. Paul J. Rainey. The weird and sharp calls of the hyena, immediately prior to feeding times, are positively startling, and echo throughout the building.



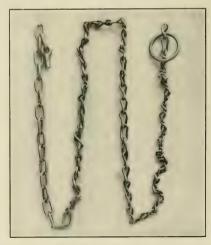
FEED PAIL STRUCK BY CHARGING DEER. The arrow marks spot penetrated by one tine.

Savage Deer .- There are few animals that fight with courage and abandon of a deer. And when thoroughly aroused there are no limits to the expression of their rage. These outbursts occur in the most unexpected manner and then even the smallest ones become formidable antagonists. Sometimes these attacks are made upon the keepers and although long experience has taught them to know the psychological moment to evade a rush, it is not always possible to reach a place of refuge. An experience of Keeper Quinn with a Columbia black-tail buck, illustrates the energy that a small animal can exert to do damage. Quinn entered the corral—as he had been doing regularly, carrying a large galvanized iron pail filled with crushed oats. Without the slightest warning the little buck made a furious charge at the keeper. Fortunately the pail was carried in such a position as to act as a shield and received the full thrust of the deer's antlers. One of the brow tines passed entirely through the metal and the impact of the blow completely flattened the side of the pail. These pails are made of heavy sheet iron and are reinforced top and bottom.

An Elephant's Strength.—The condition of the links of the chain in the accompanying cut would indicate that some great force had been exerted to twist them in this fashion. The chain is made of soft steel, two-inch links, quarterinch material, and capable of bearing a weight of 3,000 pounds. It is used for shackling the young African elephant Kartoum while the keeper is cleaning the stall. The elephants are not usually shackled except under such circumstances. But it is necessary then, because each elephant feels incumbent to assist, at least to the extent of carrying away shovels, brooms or any other implements lying about. When the chain is placed around his leg—usually one of the rear ones—he swings about and turns continually. When the links of the chain can no longer pass, the entire chain turns. That is exactly what Kartoum did, and the photograph shows the links twisted completely around.

The Spectacled Bear.—Although the spectacled bear comes from an elevation of about 10,000 feet in the Andes, he has suffered greatly from the cold. This was a surprise to us, as we imagined he would be very hardy. His sleeping den was filled to the top with bedding and he remained in it the greater part of the time. When he did venture out he shivered so noticeably that we found it necessary to entirely enclose his cage with frames filled with glass.

South American Bears.—We are now in possession, so we are led to believe, of the only living captive examples of South American bears. One of these, the typical spectacled bear, (Ursus ornalus), is exhibited at the Bear Dens, and in the Small-Mammal House are two specimens representing the sub-species, majori. One of these possesses a light patch of hair on the forehead suggesting the spectacles of the typical form. The other is quite black above.



ELEPHANT SHACKLE CHAIN.

Bear Cubs .- We were recently startled to see our big male grizzly bear walking about with a newly-born cub in his mouth, which he had killed. Before we could enter the den to find out if there were additional cubs, the male appeared with another, which had also been killed. Our keepers then armed themselves with clubs and entered the sleeping den, where they found a third cub, which the mother bear seemed not at all inclined to protect. We rescued this youngster and, having no other resource, placed it in charge of a large cat which had several kittens. The cat at first took kindly to the bear, but deserted it, evidently irritated by its squealing. since a few hours later when we made an investigation, the cat and her kittens had disappeared. We afterward found her on a high shelf, looking down at the bear with considerable annovance. A second attempt was made to introduce the helpless youngster to the foster mother, which was locked in a large box with it. She then assumed the care of the cub. side the attention of its feline guardian, it was fed from a bottle four times a day. It survived only seven days.

Fighting Deer.—All of the male deer appear to be unusually vicious this winter. Some ten days ago two fallow deer bucks engaged in a duel which resulted in one being fatally wounded. Three days later an axis deer was killed; and almost immediately after this, our two mule deer bucks fought through a fence with such persistence that one was stabbed in the breast

and died within a few minutes.

Great Apes.—Like many human beings, our family of great apes, the chimpanzees and orang-utans, have been attacked with the fall and winter visitation of bronchitis. Each member of this collection has had a touch of illness, but at present they are again in good condition. Keeper Frederick Engelholm has been very faithful, day and night, in earing for his sick

charges.

Playful Goats.—The interior of the Small-Deer House may appear to some of our visitors, more like a boiler shop than an enclosure for hoofed animals. The pandemonium which at times reigns within that structure is created by the several specimens of goats enclosed there for the winter. Among these are two particularly fine specimens of the Suleiman markhor, and an exceptionally fine Persian ibex. The great horns of these animals are employed in delivering playful but terrific blows upon the iron partitions of their cages. In consequence, all parts of the cage work enclosing these animals have been reinforced with T-iron bars.

First Snow. - During the recent snow storm, the outdoor animals hugely enjoyed the return of actual winter conditions. This was particularly evident with the musk-ox, which animals sported about in the snow, wallowing in all the deep places. The mountain goats also appeared to enjoy the storm, and during the time when the snow was drifting heavily over the roof of their building, they climbed to the highest point and stood facing the wind. The bears indulged in their usual clownish gambols. Immediately after the storm ceased, the bison presented a highly impressive spectacle. They had declined all use of their shelter sheds, and remained out during the night in the storm. Their coats were thickly matted with frozen snow, which seemed to magnify their generous proportions.

A small flock of Canada geese had evidently spent the night in their pond, and in resting in the water had turned their heads away from the wind. Their backs and wings were thickly powdered with snow. The trees and shrubbery of the Park recalled the conditions of a dream picture. Every twig and branch was magnified to eight or ten times its natural size by the snow which fell earlier in the storm, while the temperature was higher. Incidentally, some of our evergreens were sadly bent under a heavy mantle, and Mr. Merkel's men were busy for hours removing the big snow caps from the more valuable shrubbery.

New Snow Leopards.—As an illustration of how different is the temper of an animal cramped in a small cage and in constant fear of attack, from one in more commodious quarters, we quote an illustration, involving our new snow leopards. When these animals arrived at the Park in their travelling cages, they were snarling, and making such demonstrations that we were led to believe they were uncommonly vicious. During the work of liberating them in the large central outside cage of the Lion House, we had some difficulty in keeping out of reach of their claws. The contrast between that behavior and their present disposition is interesting. Our keepers now enter the cage of these animals, armed with nothing more than brooms, and the leopards manifest toward them no hostility whatever.

Hardy Felines.—Three species of the larger hardy felines will occupy outside cages of the Lion House during the winter. These are the snow leopards, the Manchurian leopard and the two very beautiful examples of Siberian tigers, which came to us last year, and are growing rapidly.

ZOOLOGICAL SOCIETY BULLETIN.

ELWIN R. SANBORN, Editor.

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Mammal W. T. HORNADAY.

Reptile
RAYMOND L. DITMARS.

Aquarium
C. H. TOWNSEND.
RAYMOND C. OSBURN, Ph. D.

Bird C. William Beebe. Lee S. Crandall.

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JANUARY, 1912

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CAPT. JOHN SANFORD BARNES, U.S. N.

At a meeting of the Executive Committee of the Board of Managers of the Zoological Society held on December 12, 1911, the following resolution upon the death of Captain John Sanford Barnes was adopted:

The late Captain John Stanford Barnes, U. S. N., became one of the Managers of the New York Zoological Society, and a member of the Executive Committee in January, 1897, and

served actively until his death.

Captain Barnes deserves no small share of the credit of the successful organization of the Society, and in its early struggles his cheerful enthusiasm and confidence were a constant source of inspiration and help to his associates, especially in the negotiations with the municipal authorities, leading to the foundation of the Zoological Park.

The Executive Committee experience in his death the loss of a friend, a counsellor and a great-hearted gentleman, slow and cautious in criticism, ever prompt and generous in approval and praise. His loss to the Society and to the City is one that is deeply felt, and his colleagues desire to record their profound sense of personal bereavement and their appreciation of his tircless service in the cause of science, and in the work of the Zoological Society.

WILLIAM EMERSON DAMON.

William Emerson Damon died at his home in Windsor, Vermont, November 30, 1911, at the age of seventy-three years. Dr. Damon was a pioneer in aquarium studies in America, and his sister, Miss Elizabeth E. Damon, was probably one of the first persons in the United States to maintain a private, fresh-water balanced aquarium. Mr. Damon's interest in aquatic life was first aroused when as a boy he visited the Aquarial Hall in Boston, and throughout his life this interest never waned. He was a member of the New York Zoological Society and various other scientific bodies in this country and England.

Mr. Damon worked actively for the establishment of the present aquarium at Battery Park; his advice was sought in the selection of the original corps of employees, and two of the three members especially chosen by him are still on the staff. His deep interest in the New York Aquarium can best be judged from a remark made by him sometime ago "I am glad to have

lived to see a free public aquarium in New York, that is so successful and so much appreciated by the public." R. C. O.

A BIG TRINIDAD SNAKE.

We have received an interesting letter from Mr. R. R. Mole, of Port-of-Spain, Trinidad, who has obtained for us all of the bushmaster snakes that we have received from that island, We are also indebted to Mr. Mole for other important reptiles from Trinidad and the coastal regions of Venezuela. From him we obtained our big anaconda; and relating to these huge water snakes, as found in the region, he now writes:

"As you are interested in big anacondas, you may like to know that I have an immense beast now. Although she is not enormous in girth. she is very bony and gaunt, and actually measures (I have taped her), seventeen feet! Her skin hangs loosely upon her, and yet in this condition she weighs 104 pounds. Thin as she is, this snake is impressive. As it is not long from the time when these snakes give birth to young, this may account for her emaciated condition.

"She was captured by the men who captured Big Annie, and when I first saw this new specimen, I thought they had caught her with a forked stick with a spike in the fork. They solemnly swore that this was not so. Nevertheless, she had a punctured wound about one inch behind the line of the eves, and almost in the center of the back of the head. I got her into a large tank, and from later indications I was led to believe that she had fed upon an anteater. I found an immense claw which I supposed belonged to Tamandua tetradactyla. Further examination revealed pieces of hair which made me positive that she had swallowed a large specimen of our ant-eater.

"A few days after this I saw the men who captured her, showed them the claw, and they agreed with me, asserting what I had never thought of,-that the Matapel (dog killer), our local name for this ant-eater, had made the wound in the anaconda's head, which I now think quite likely. I annointed this wound with a healing balsam, and the snake now seems tolerably well, although there is a likelihood of the wound breaking out again. I am going to try to feed this snake with rabbits, in the manner prescribed in your book on reptiles. She has one or two superficial wounds about the body, and I am sure the Matapel did not succumb before he had made a terrific fight for

life. They are dreadfully strong beasts, and their claws are powerful, long and sharp.

"The other day a dead boa constrictor was brought to me. I think it was larger than Castro. I taped it and it measured eleven feet seven inches in length, and was thickly built. It seized a hunting dog and the dog's owner was so afraid that it would kill the beast.—'It had lapped it up,' he said,-that he destroyed the snake. It was a wonderful specimen, and I told him that it was worth forty of his wretched curs, such as are used by the peasantry in what they call hunting.

"To return to anacondas, I don't think there is any doubt from what I have learned lately. that some day I may get a very much larger one than Big Annie or the specimen now in my possession." R. L. D.

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MAY 24-DECEMBER 12, 1911.

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POTC

OUR SERIES OF RARE MAMMALS. By R. L. DITMARS.

Curator Reptiles; Asst. Curator Mammals.

A MONG those interested in the maintenance of a zoological collection, and on the lookout for new and interesting specimens, there is a designation for certain creatures infrequently received as "rare" exhibits. This so-called rarity may be brought about by two causes, namely, the difficulty of capture of representatives of some species, or the inability of an animal to survive a long voyage, or endure long confinement under cage conditions. It is the so-called delicacy of many species that has rendered them so rare on public exhibition. With the period of construction in the Zoological Park now almost completed, we find more time to study the ways and wants of the delicate species.

During the past five years, we have been endeavoring to maintain a number of species of small mammals not often found on exhibition. In this short resume a few of our results are cited. The points relating to the cage, temperature and food of nearly allied animals are the primary factors to consider.

Of course a proper amount of light is an essential. With some species the right amount of light means but little of it; while others crave the sun, and without it are as sluggish as many reptiles. Exercise is absolutely essential, and with some species it is impossible to produce this without nervous stimulation.

While the question of temperature is important, it is of interest to note that even the tropical species do better in moderate heat than in an overheated temperature. None of our experimental animals are coddled within stuffy, poorly-ventilated cages, as has been a common practice with such creatures. We know that pure air is one of the requisites. Feeding is the next most important factor; and it is not only

the question of the character of the food, but how to present it to the animal, that must be considered. Many animals are ravenous in appetite, and the common result among such is gastritis. This comes not entirely from the type of food used, but partly from permitting the animal to gorge itself, with the consequence of being unable to assimilate the entire contents of the stomach. On the other hand, some specimens will starve, unless coaxed and teased to eat,—a process that may necessarily require repetition a half-dozen times the day, with a variety of the foods that are most tempting.

From past experiences, and consultation among our colleagues, we have divided those types of mammals that are extremely short-lived in captivity, into several groups. One of these includes species that succumb to gastro-enteric troubles, others that are sluggish, and another group of excessively nervous types.

The members of the two latter groups are poor feeders. Often they die from malnutrition, when the internal organs show few traces of actual disease. With a keeper of sympathetic interest in charge of a miscellaneous collection of delicate mammals, it is a question of constant experimenting until the needs and ways of the dumb charges are elicited, one after another. At times the requisite points of successful treatment is discovered by accident. This was illustrated to the writer in the case of the Egyptian jerboa, a remarkable, kangaroo-like rat.

While in London he purchased two lots of these interesting creatures, one of which was intended for exhibition in the Zoological Park, the other to be employed as exhibits in the writer's lectures among the public schools. The former lot was placed in the Reptile House, and provided with the standard sleeping house. The writer noted that all the specimens would pack into their nests during the day, and when examined



RED HOWLER MONKEY.



HUMBOLDT'S WOOLLY MONKEY.

appeared to sweat to a certain extent. As it was necessary to carry his personal specimens about during the cold winter nights, this tendency appeared dangerous, so the sleeping box of the specimens in question was experimentally removed, and the animals were given a handful of loose hav. This they soon cut into countless fragments, gathered in a mound, while they nested quite exposed within a slight concavity in the center. The temperature of the room in which they were kept ordinarily dropped to 50° F. during the night. Moreover, the rodents were frequently taken out at night, in a small box within a satchel. In such cases they were provided with cotton waste, but were often exposed to very low temperatures.

During the first six months of their captivity, the writer was inclined to believe that he had been particularly fortunate in maintaining this lot without a single loss. At the same time, fifty per cent. of the Park specimens had died, though receiving every attention. The writer's specimens were frequently handled, and being without means of hiding had developed semidiurnal habits. With the coming spring, and the loss of the remainder of the jerboas in the Reptile House, the writer decided that it was not mere luck that resulted in the good condition of his four examples against the loss of ten that had been nested, with every precaution. The decision was to experiment with several groups of jerboas without provision for hiding. About twenty examples, representing two species, were obtained, and the cages provided simply with a shallow layer of cut hay. The result was interesting and satisfactory. About seventeen of the original twenty specimens are yet in thriving condition—nearly two years after beginning the test.

The result was of considerable value, as it demonstrated similar possibilities with other species of secretive rodents. We have thus profited in two ways. Our rodent collection is not merely a series of empty cages with mysterious sleeping boxes, the contents of which would be indicated by label only, but the animals are in view. They are surprisingly active, considering the nocturnal habits of the greater number of them, while an elaborate series of species, some alleged to be very delicate, is in fine condition.

In this way we solved the problem of exhibiting and maintaining a representative collection of the smallest rodents. A number of the species are quite uncommon, as regards the usual run of zoological exhibits. We are now experimenting on the care of those species of very small monkeys and lemuroids that seldom are seen in captivity, owing to their extreme physical delicacy. We rate the marmosets, lemuroids, the pottos and the Malavan species of loris, as creatures of similar feeding habits to the small nocturnal species of reptiles. While specimens of these species may be induced to take food during the day, it is during daylight that they are usually inactive, and food partaken at such times is not assimilated with the



FLYING FOX: FRUIT BAT.

same results as when consumed by a creature that is alert and moving.

With these nocturnal primates, as well as with all our monkeys, it is our rule never to "gorge" them, but rather to serve their food in several meals. By offering a very moderate amount of food, at a regular hour during the morning, we have taught our nocturnal animals to expect this routine, and they are in consequence awake and ready for it. In the room in which they are kept is an exercising shelf, fully forty feet long, from which there is no possibility of escape. On this, after eating, these creatures which usually evince sluggish habits in captivity, are placed. They are fed again at night. From our studies of their likes and dislikes we have found them to be largely carnivorous. On a diet consisting largely of young rats and birds, we have had uniform good luck with them, and have noted no specimens afflicted with cage paralysis.

Experiments are now being conducted with two monkeys rarely seen in captivity. These are a Humboldt's woolly monkey and a red howler. These species are notoriously delicate, their average life as captives being about three months. After keeping them in a veritable sun room, giving them constant exercise, keeping them hungry by feeding a little at a time, every few hours during the day, we have the satisfaction of herewith publishing their photographs and explaining that the woolly monkey has been in our possession about eighteen months, and the red howler has about doubled the limit usually given such specimens to survive. The latter are markedly carnivorous, and we feed them largely upon boiled meat, beaten eggs and sterilized milk.

As examples of other delicate and rare mammals on exhibition in the Park, it is of interest to mention the continued thriving condition of the panda, which is fed only at night, and the greater kudu, exhibited in the Antelope House. The latter often is regarded as "impossible" for zoological gardens. The kudu has suffered once from gastric troubles, until a certain amount of grain, apparently too small for a mammal of its size, was found to be properly assimilated. On this measured amount, it has been daily fed, for over two years, and the prime condition of this rare and beautiful creature shows the result of the keeper's sympathetic attention.

In closing this summary it is appropriate to mention the two huge Hoffman sloths that have lived in the Primate House during the record time, for these sluggish creatures, of over four years.

PYGMY ELEPHANTS OF AFRICA.

By R. L. GARNER.*

N offering this small contribution to science, I do not pose as an authority on elephants; on the contrary I claim to know very little about them from actual experience. The sole motive that I have in selecting this subject is simply to transmit to others who are interested in them some data gained from native hunters and white traders in the French Congo, where I have spent many years and most of the time in the locality where this little-known race or species of the dwarf elephant abound.

As a rule all native stories about large animals are more or less distorted; but at the same time they usually contain some element of truth which is worthy of being sought out. To find the ultimate facts, the most feasible plan is to compare the different versions of a current report and give most credence to those details which most nearly coincide in all of them. The process of searching out the fundamental facts of native stories is something like the arithmetical process of finding the greatest common divisor of a series of numbers. By such a method, I long since arrived at the conclusion that two distinct types of elephant inhabit the basin of Lake Fernan Vaz, and the banks of some of that lake's tributaries. It is now more than five vears since I reported this fact to Dr. Wm. T. Hornaday, director of the Zoological Park.

The first reports that I heard of the existence of two species of elephants were rather vague, and in some points conflicting; but all concurred in giving a distinctly different name to each of the two types described, and in assigning the smaller one to certain localities.

In the Nkami country, where both types are well known, and as I think very accurately described, the ordinary elephant is universally known as njagu while the smaller one is called mesalla. All the native hunters concur in most points in their description of the differences between the two races, and this description is confirmed by several white traders that I have met in that country.

The common type of elephant is distributed over nearly all parts of the French Congo, while the pygmy type is found only in one small locality, in the Fernan Vaz district, and that is on the north and east sides of Lake Ntyonga, and between it and Lake Nenga. They are prob-

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AFRICAN SUDAN ELEPHANTS: KARTOUM AND SULTANA.

Male at four years of age, was six feet, three inches and weighed 2,300 pounds

ably found in some other parts of the French Congo, and I have heard of two other sections in which they are said to exist. The district described is about one degree thirty minutes south latitude and about seven degrees east longitude. The intersection of those lines would be near the centre of the district in which I have heard of the mesalla as being most abundant.

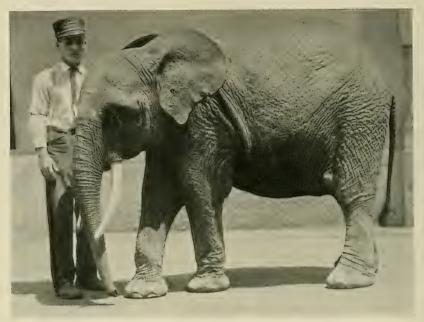
The ordinary type of African elephant is so well known to science, and so frequently seen in captivity, that no description of it is here needed, except such details as are involved in the comparison with mesalla, the pygmy. The larger type grows to a height of about nine and onehalf to ten feet and evidently attains a weight of five or six tons. The tusks of the larger males sometimes reach seven feet in length, about foursevenths of which are exposed. The mesalla elephant is said never to reach a height of seven feet, and many of the natives say that it never becomes taller than man. So far, there have been in Africa no means of weighing any of them accurately; but the natives generally agree that they never become heavier than a mediumsized hippopotamus; which would mean between two and two and a half tons.

The tusks of the mesalla are very small, and rarely exceed twelve or fifteen inches in length of the exposed part. In fact, I have often heard it asserted that their tusks never reach a foot in length; but this statement is probably erroneous.

Another point in which the two types greatly differ is in the size and shape of the ears. The ear of a njagu, or large elephant, covers the whole side of the neck; and the lower edge of it extends below the line of the lower jaw, as seen in the cut given herewith. The extremity of it laps about half way over the shoulder.

The photograph here given is of a young elephant in the Zoological Park, commonly called the Sudan elephant. At three years of age the male measured five feet, two and one-quarter inches high and weighed 1,460 pounds. When four years old he was six feet three inches high, and weighed 2,300 pounds. It can thus be seen that in about one year it gained nearly a foot in height and nearly 1,000 pounds in weight.

The next photograph represents the type specimen referred to above, which is supposed to be the pygmy mesalla, at eleven years of age. It can readily be seen that the ears are of an



PYGMY AFRICAN ELEPHANT (Elephas pumilio).

Congo type of mesalla at eleven years of age. Height five feet and weight 1,650 pounds.

entirely different type. They are very much smaller in size, have a reverse curve in the lower edge and a rounded point resembling a lobule. The lower point of this is far above the line of the neck, and the ear is but little more than half the area of that of the Sudan type. The relative sizes and weights of the two animals are still more striking. The pygmy mesalla at six years of age measured only three feet eight inches in height and weighed 600 pounds, while at eleven years of age he stands only five feet high and weighs only 1,650 pounds, from which it may be seen that in five years he gained only one foot four inches in height and a little more than 1,000 pounds in weight.

In June, 1905, Carl Hagenbeck offered to the New York Zoological Society a small and evidently young African elephant which was instantly recognized as representing a species never before seen in captivity, so far as records were available. The price asked, \$2,500, was about twice the amount that would have been sufficient for an elephant of that size representing any of the known species. The specimen from the French Congo was immediately purchased; but before it left Hamburg it was seen by Prof. Noakes, and by him it was described as a new species, and christened *Elephas pu*milio.

While the specimen here represented conforms in many ways to the description of mesalla, it is barely possible that it may not be the true mesalla of the Fernan Vaz basin; but at any rate, the differences between him and other African elephants are so great as to put him in a group by himself. If not a true mesalla, which is suggested by the size of his tusks, he is probably an intermediate type between the njuga and mesalla.

Another very important characteristic that distinguishes the mesalla from all other elephants and which has been frequently described to me and emphasized, is the malicious nature of this elephant in a wild state. It is currently reported in the district that I have pointed out that very few native hunters, or white hunters either, as to that, however well armed they may be, have the temerity to hunt the mesalla, or to



MALE INDIAN ELEPHANT, GUNDA, AT TWELVE YEARS OF AGE, NEW YORK ZOOLOGICAL PARK.

Height eight feet nine inches and weight 7,800 pounds, nearly four tons. This specimen in five years, increased two feet three inches in height and increased nearly two ons in weight.

molest it when found, for the reason that it is alleged that they will charge the hunter with little or no provocation, and not only will the leader charge, but the whole herd will jointly make the attack. Mr. Frank Williamson, an English trader who has lived for more than thirty years in that territory and has been a daring hunter, tells me that the mesalla is the only animal that he avoids on all occasions.

Another striking peculiarity of this elephant is that it is more diurnal in habit than the larger type, and much more given to grazing on the open plains, where they are frequently seen in broad daylight, and in larger herds than are usual with the others.

Another habit worthy of remark is that of their playing and gamboling with one another. I have several times been assured that they periodically chase each other about in a playful manner, scuffle, and slap each other with their trunks as kittens do with their paws.

Another thing that is alleged of these animals is a gait entirely different from that of any other elephant either Indian or African, one of which trots, and the other paces, while it is averred that the mesalla lopes or gallops when he runs. I offer this information as it has been given to

me, and without vouching for its accuracy. One observant white man, who has been a successful hunter and the only one that I know of who claims to have killed a mesalla, has assured me, however, that the gait of the mesalla is peculiar in the fact that when running he gallops with his front feet and trots with his hind ones. In other words, it was stated that the mesalla lifts its two front feet at the same time, while it alternates with its hind ones.

I forego any further details of anatomical differences and leave them to be set forth by others later on. The information here offered concerning the habits and general appearance of the animal, I give for what they are worth, but in the belief that they are entirely new to science. While I do not vouch for the accuracy of all of them, I believe they are substantially true.

Aquarium.—During the winter months the Aquarium will be open to the public between the hours of 10 A. M. and 4 P. M.

Annual Meeting.—The Eighteenth Annual Meeting of the New York Zoological Society will be held in the Grand Ball Room of the Waldorf-Astoria, January 9, 1912. An interesting program has been arranged.



CAROLINA PARRAKEET.

THE CAROLINA PARRAKEET.

By LEE S. CRANDALL.
Assistant Curator of Birds.

MONG the great zoögeographical regions of the world, the nearctic, which includes the greater part of North America, seems to have suffered most severely from the modern extermination of wild forms of life. Hardly a single large game animal is holding its own in numbers, while many of the game birds are in an even worse plight. The Labrador duck and the passenger pigeon have gone; the heath-hen and the whooping crane have been reduced to pitiful remnants of what once were widely distributed species. The former is now confined entirely to the island preserve on Martha's Vineyard, and the cycles of the lives of these few individuals are guarded and watched as carefully as possible by wardens and scientific investigators. The cranes are scattered to the four winds, protected only by their powerful wings and keen instinct for self-preservation. These birds have been persecuted unceasingly by reckless sportsmen who did not realize the wrong they were doing until the harm was done. Other species, also, which are not included in the category of game birds, are fast disappearing, and one of these forms the subject of the present article.

The Carolina Parrakeet, (Conuropsis carolinensis), was formerly a bird of fair abundance throughout the eastern and central United States. Great flocks roamed the country from Florida to the Great Lakes, and from Colorado to Texas. There are records of their occurrence in twenty-two states and one territory, with a probability of their having strayed into five others.

These birds were remarkably hardy for members of their Order, and numerous instances have been recorded of their appearance during snow-storms, and in the depth of winter. It seems probable, therefore, that the parrakeets roamed throughout the year over a great portion of their range, and nested in many parts of it. Their food consisted of such wild seeds, nuts and berries as they were able to find, the cockleburr being mentioned as one of the favorite articles of their diet.

It is unfortunate that not a single properly authenticated description of the nest has been published. A consideration of the methods of nidification of most other Psittacine birds, and particularly of those of the very close relatives of Conuropsis, would lead to the conclusion that the eggs were laid, in all probability, in hollows of trees. This was stated to be the case by both Audubon and Wilson and is confirmed by information obtained by Dr. Hornaday at Grant,

Florida, where a number were caught in 1883 by a man living at the mouth of the Sebastian River.

William Brewster states that he was informed on what he considered very good authority, that the birds built flimsy nests, much like those of mourning doves, in forks near the ends of horizontal branches of small cypress trees. However, all of these reports lack essential details, and it seems probable that the nesting habits of this interesting bird must remain forever in some doubt. The egg, on the other hand, is well known. It is pure white in color, as are all of the known eggs of parrots, typically oval in shape and measures 1.44 by 1.12 inches.

The bird itself is bright green above, with the forehead, crown, checks, region of the eyes and lores reddish orange. This is followed by a yellow collar which includes the chin, sides of the neck, nape and occiput. The breast and the under surface of the tail are yellowish green, and the bend of the wings and the thighs reddish orange. The bill is white and the iris of so dark a brown as closely to approach black.

That the species has been reduced to its present low numerical condition is a matter for the deepest regret. Its range, once so wide, has become more and more contracted with the advance of civilization, so that if the species still survives, it must be limited to a few individuals in the wilder parts of Florida. The Big Cypress Swamps of Southern Florida seem to be the most probable home of the survivors, if any remain.

This extermination has been brought about by an intensification of the adverse conditions which have affected most of the native fauna since the colonization of North America begun. While the birds were of immeasurable benefit as destrovers of the seeds of noxious weeds, they were equally fond of stripping the young buds from fruit trees, and great numbers were shot by farmers for the protection of their orchards. Many were taken alive, and either caged in this country or shipped to Europe. Dr. Hornaday, in his American Natural History, mentions the following relevant incident: "In 1883, a colony of about thirty birds which nested on the Sebastian River was completely destroyed by a local hunter who captured the entire flock, and sent the birds to a New York dealer, in whose hands all those which reached him alive died in a short time." Feather-hunters preyed upon the scattering flocks, and the havoc was completed by indiscriminating hunters who shot this bird and the splendid ivory-billed woodpecker simply to gratify a desire for the unusual.

One peculiar trait of the birds must have greatly facilitated their slaughter. When a flock had been fired at, the uninjured members never failed to turn and whirl screaming above the bodies of their fallen companions, thus giving the marksman opportunity for firing again and again, until the survivors became too few to make firing profitable.

After these details of destruction, it is pleasing to find that at least a small number of the birds taken alive still survive. The species had never been represented in the collection of the Zoological Society until August 31, 1911, when a pair arrived at the Park as the gift of the Cincinnati Zoological Gardens, through Mr. S. A. Stephan, General Manager. Mr. Stephan informs us that the birds were purchased in 1889, at three dollars each, and have consequently been in his possession for twenty-two years. During the first six years, numerous eggs were laid, but they were invariably thrown from the nests and broken. Besides the two birds now in our collection, six of Mr. Stephan's original flock remain in the Cincinnati Gardens.

The only other Carolina Parrakeets known to be in captivity are three birds in the National Zoological Park in Washington, and we are indebted to Dr. Frank Baker, Superintendent, for information concerning them. Two of the specimens were received from Florida in 1898, and so have passed thirteen years in captivity. The third is the property of Dr. Paul Bartseh of the United States National Museum, and has been the companion of the two others for a number of years. Although conditions have been favorable for breeding, and two of the birds have given evidence of a mutual fondness, no eggs have ever appeared.

As far as can be learned, then, there are exactly eleven Carolina Parrakeets known to be living, of which we have two. Dr. Hornaday believes that, in view of the thoroughness with which every portion of Florida has been explored, especially by Messrs. A. W. and Julian A. Dimock, and many ornithologists, there is not at this time even one colony alive in Florida, or elsewhere.

Mr. David Seth-Smith, Curator of Birds in the Zoological Gardens of London, has made a careful canvass of the collections of living birds in England and on the Continent, and through his kindness we are able to state that not a single bird remains in captivity in Europe. The last specimens obtained by the Zoological Society of London were received in 1891, one living until June, 1902. One which died in Berlin in November, 1904, was probably the last of the thousands shipped to Europe from America.

If our birds survive until the return of warm weather, they will be placed in an aviary suitable for breeding, and offered every inducement to undertake the task of reproduction, but extreme old age is strongly against the chances for thus increasing the numbers of this vanishing race.

AQUATIC TOADS.

V E are exhibiting two species of Batrachians, representing the CV World forms of the toads or frogs that are strictly aquatic, quite unable to move about when out of the water. The fish-like motions of these exceedingly droll creatures are of particular interest to visitors.

The two species exhibited are popularly known as the Smooth-clawed Frog and the Surinam Toad. The former, technically known as Xenopus laevis, inhabits Africa, from the Cape to Abyssinia. It receives its common name from the very apparent sharp black claws. The hind feet are enormously developed and very generously webbed, and with them the creature swims with the ease of a fish, resorting to slow twists and turns, or darting into a dark corner if frightened. The eyes are minute and placed upon the top of the head. The tadpole of this curious creature has two very long tentacles protruding from the snout.

The most remarkable habit of the Smoothclawed Frog appears to be its ability to utter a metallic call while under water. We have noted our specimens going through this performance and making enough noise to be heard a distance of thirty to forty feet. This was taking place while they were at the bottom of their tank-under two feet of water. They appear to be hardy, and greedily devour earth worms or small fragments of raw beef. Their breathing habits differ from those of the Surinam Toad, as the eggs are apparently attached to water plants, and contain when deposited wellformed embryos. The tadpoles hatch within a period of forty-eight hours. Transformation into the adult form is rapid.

Our other aquatic toad, the familiar Pipa americana, is the famous Surinam Toad, coming chiefly from the Guianas. It is seldom exhibited as a living captive, and thus forms one of the strangest features of our collection in the Reptile House. The general form is very peculiar. The entire creature is much flattened, and the head is triangular. The eyes are reduced to mere pin-points, and the skin forms a number of short, irregular serrations on the upper lids, in front of the eye and at the angle of the mouth. The fingers are very slender, and end in starshaped tips. As with the Old-World species, the rear appendages are greatly developed and extensively webbed. Remarkable in the life history of these batrachians is the structure of the skin on the back of the female, which assumes a pitted growth, for the reception of the eggs which are placed there by the male. In these epidermal craters the young undergo their entire metamorphosis.

Surinam Toads are best collected at the end of the long dry period, when they are confined to the partially dried-up pools. In such conditions they never breed. Breeding takes place at the time of the great freshets. The male arranges the eggs on the back of the female toad. in cavities which appear to be pouches of the skin. A rapid structural change appears to take place in the epidermis, in the course of which there exudes from such egg-pit what appears like a lid, similar to the structure at the mouth of the tunnel of a Trap-door Spider. The entire transformation from the egg to the small perfect toad is rapid. After the young have escaped from the back of their mother, her skin soon resumes its normal appearance.

While our aquatic toads from Africa feed voraciously upon any animal matter that may be placed in their tank, it is more difficult to induce the Surinam Toad to feed. We have observed that our specimens are uniformly fond of small, living fishes, and that they prefer to feed at R. L. D. night.

RECENT ARRIVALS.

Mammals,-Gorilla; Chimpanzee; Black Howler Monkey; Red Howler Monkey; 2 Spot-nosed Monkeys; 5 Bearded Monkeys; Diana Monkey; Campbell Monkey; 2 Moustache Monkeys; Chaema Baboon; 3 East African Baboons; Poto; 2 Mouse Lemurs.

2 Lion Cubs; Adult Leopard; 2 Leopard Cubs; 2 Snow Leopards; Ocelot; Margay Cat; Andes Black Bear; Spotted Hyena; Hunting Dog.

Prong-Horned Antelope; Blessbok; Prjevalsky Wild Horse (born); Eld Deer (born); Axis Deer (born); 2 Mule Deer.

5 Rock Squirrels; Big-eared Rat.

Birds.—2 Black Spur-wing Geese*; 2 Carolina Par-rakeets*; Senegal Parrot; 3 Yucatan Jays*; 14 Lesson Euphonias*; 4 Black-throated Crested Quail*; 6 Black-breasted Bob-white; 2 Black Storks; 2 Red Lories*; 2 Eastern Pratincoles*; 4 Hey Rock Partridges; 2 Giant Kingfishers; 2 Australian Sheldrakes; Red-billed Hornbills*; Yellow-breasted Weaver*; Whippoorwill*; South American Turkey Vulture*; 2 Orange-headed Vultures*; Canvas-back Duck; Siberian Ruby-throated Robin*; 5 Baldpate Ducks; Cuban Cuckoo*; Cuban Flicker*; 3 Eye-browed Woodpeckers*; 6 Cuban Green Woodpeckers*; 3 Cuban Banded Woodpeckers*; 2 Cuban Trogons; 2 Duck Hawks; 2



AN OLD PROSPECTOR.
Painting by Carl Rungius; gift of Mr. Emerson McMillin.

Copyrighted by Carl Rungius.

Double-creasted Cormorants; 7 Nightingales; 3 Florida Redwings; Osprey; South American Rufous Hawks*; 4 Bonham Rock Partridges*; 5 Garden Warblers; Black-necked Screamer; 4 Kurrichane Hemipodes*; 4 Serin Finches*; 5 Himalayan Siskins*; Maroon Oriole*; Cinnamon Sparrow*; Gannet; 14 Sanderlings; Bald Eagle; 2 Baya Weavers*; 2 Shoveller Ducks; 4 Rustic Buntings; 4 D'Orbigny Blackbirds*; 2 Short-winged Sparrow-hawks; 6 Cuban Bob-white; 2 Giant Kingbirds*; Lawrence Owl*; 4 Cuban Meadowlarks*; 2 Cuban Boat-tailed Grackles*; 2 American Flamingoes; 12 Yucatan Cardinals*; 6 Yucatan Mockingbirds*; 2 Barnard Parrakeets; 7 Jungle Fowl Hybrids*; Elliot Pheasant; 3 White Wagtails; 2 Crested Seriemas; 4 Lapwings; 4 Knots; European Dunlin; 2 Black-belied Plover; European Golden Plover*; 3 European Oyster-catchers*; 3 Spotted Red-shanks*; Bar-tailed Godwit*; 4 Common Red-shanks; 3 Tadorna Sheldrakes; 2 Rederested Pochards; 4 Tufted Ducks; 3 White-eyed Ducks*; 4 Brown headed Gulls*; Lesser Blackbacked Gull*; Gannet; Snowy Egret.

 $\begin{tabular}{ll} Reptiles. —Alligator, & 9 & feet & 11 & inches; & African Crocodile; & 2 & South & African Crocodiles. \\ \end{tabular}$

Alligator, 9 feet 11 inches; African Crocodile; 2 South African Crocodiles.

1 Yucatan Terrapins; 4 Keeled-back Turtles; Hinged-back Tortoise; Leopard Tortoise; 2 Angulated Tortoises.

Egyptian Monitor; Gila Monster; Exanthematic Monitor; 5 Tegus; Leaf-tailed Gecko; 6 Black

Iguanas; Tiger Lizard; Frill Lizard; 4 Spiny-tail Lizards; Muricated Lizard; Cunningham Skink; 2 Cyclodes; 4 African Chameleons.

Cyciodes; 4 African Chamletons.
6 Central American Boas; 2 Green-headed Snakes;
Crebo; Rough-scaled Sand Boa; Brown Sand Boa;
4 Ringhals; Puff Adder; 2 South American Rattle-snakes; Horned Rattlesnake; 2 South American
Striped Snakes; Green Tree Snake; Egyptian Cobra;
3 Horned Vipers; 2 Sharp-nosed Snakes; Fer-de-lance; 2 Golden Tree Snakes; Butler Garter Snake;
138 Snakes collected in Sullivan County by R. L.
Ditmars.

5 Surinam Toads; 13 Marine Toads; 4 Indian Bull Frogs; 2 White Axolotls; 4 Hellbenders.

A GIFT OF ANIMAL PAINTINGS.

N due process of development, the Zoological Society will eventually possess a collection of animal paintings and sculptures, for which accommodations already exist in the two galleries of the Administration Building that now are occupied temporarily by the Heads and Horns Collection.

As a suitable beginning for the picture collection, Mr. Emerson McMillin, a founder of the Society, has recently presented two large oil paintings by Carl Rungius, which make an excellent beginning for the proposed art collection. They were selected first because of their



WARY GAME.
From a painting by Mr. Carl Rungius; gift of Mr. Emerson McMillin.

high rank as works of art, and because they vividly portray two important species of the large game-animals of North America. Mr. Rungius has studied both species in their haunts, and these pictures represent the animals as he actally saw them in the country portrayed.

"Wary Game" is a large painting of a band of six white mountain sheep rams, (Ovis dalli), standing on rugged slide-rock at the foot of a precipice in the McMillin Mountains, Yukon Territory. Through a very dark and stormy atmosphere, a patch of light descends for a moment, and illumines the most conspicuous members of the band.

The new painting entitled, "An Old Prospector," represents a grizzly bear searching for ground squirrels in a rocky valley of the mountains around the source of the Athabasca River. It is of interest to note here that the bear was shot by Mr. Rungius in 1910.

Most persons usually think of the grizzly bear as an inhabitant of timber, and this striking picture conveys a valuable lesson on the haunts of the animal as frequently found in the northern Rockies. Photography has done this fine painting rather scant justice, and the picture must be seen to be fully appreciated.

The paintings presented by Mr. McMillin, and an elk picture, also by Rungius, hang in the

main reception room of the Administration Building. W. T. H.

OUR PROTECTED QUAILS.

N Sunday, December 17, Mr. Madison Grant, Chairman of the Executive Committee, sat with the Director of the Park, in the office of the latter, in the new Administration Building. One window of the office opens toward the beech and maple forest of Beaver Valley, and the edge of the jungle is only forty feet away.

The Secretary and Director were discussing plans for securing a five-year close season for quail, woodcock, snipe and other birds, when suddenly Mr. Grant sprang up and called to the Director to look toward the edge of the forest.

The Director quickly looked, and saw several small gray forms moving about on the sunny side of a red cedar stump,—only forty feet away. "Qauil. A whole covey of quail. They have been seen twice before in the Park. There are eleven of them." "That shows the effect of bird protection!" said Mr. Grant. The strange coincidence was accepted as a good omen for the cause of the quail.

SPECIAL NUMBER ON SMALL AQUARIA

By RAYMOND C. OSBURN

ZOOLOGICAL SOCIETY BULLETIN

Number 50

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THE BALANCED AQUARIUM.

THE small aquarium as an object of interest and decoration in the house has become so common that its presence no longer attracts special comment. The custom of keeping such aquaria is, however, of comparatively recent origin. Goldfishes have been kept and bred by the Chinese and other oriental peoples for several centuries, though, to be sure, this was mostly done in small out-door pools in the gardens.

The balanced aquarium has been clearly defined by Mr. Henry D. Butler, in a book en-

titled The Family Aquarium (New York, 1858), in the following terms: "The aquarium is a receptacle for aquatic animal and vegetable life in fresh or salt water, which need never be changed. The old-fashioned fish globes were not aquaria in the proper sense, because it was absolutely necessary to change the water in them pretty frequently, lest the fish die. The vitalization of the water without this change comprehends the leading principle of the aquarium."

Undoubtedly the failure to grasp the principle



FRESH AND SALT-WATER BALANCED AQUARIA IN THE NEW YORK AQUARIUM.

The salt-water jars are near the windows, the fresh-water ones beneath skylights. These aquaria have been much used for observation by public school teachers and their classes.



YOUNG GEOGRAPHIC TURTLES.

Young turtles are very attractive aquarium pets, but should be provided with a float so that they may climb out of the water.

of proper balance was the special factor which prevented the small aquarium from becoming popular at a much earlier period.

The facts that animals require oxygen in respiration and that green plants give off oxygen in excess was discovered and published as early as 1778, but lovers of aquatic life were slow to apply this knowledge. In fact it was not until 1850 that the first properly balanced aquarium was described by Mr. Robert Warrington of Manchester, England, in a paper presented before the Chemical Society and entitled, On the Adjustments of the Relations Between the Animal and Vegetable Kingdoms, by which the Vital Functions of both are Permanently Maintained. Warrington found that goldfishes could be maintained indefinitely in a glass jur in

which was placed some Vallisneria (tape grass) to supply the oxygen and with the addition of a few pond snails to clean up decayed vegetation. Further experiments were then conducted by him along similar lines upon marine animals and plants, and published in the Annals of Natural History for November, 1853.

The work of Mr. Philip Henry Gosse was also of the greatest importance in developing the balanced aquarium, and his book, The Aquarium, an Unveiling of the Wonders of the Deep Sea, published in 1854, showed how rapid the advancement in the study of the marine aquarium had been.

In England and Germany the small balanced aquarium soon became popular in the home. In America little attention has been paid to it, although a certain few enthusiastic lovers of aquatic life have maintained aquaria with great success from the time the principle first became known. Mr. William Emerson Damon in his book, Ocean Wonders, gives to Miss Elizabeth E. Damon of Windsor, Vermont, the credit of being the first person in the United States to keep a properly balanced aquarium, the recepta-

cle being a two-quart jar supplied with fishes, tadpoles and pondweeds (*Potamogeton*).

The idea is prevalent, born of the old days of fish globes and persisting through ignorance like many other exploded notions that the aquarium requires a vast amount of time and fussing and especially that the more frequently the water is changed, the better it will be for the animal life. Nothing could be farther from the truth, for when a balance is secured the less changing of anything the better it will be, for fear of disturbing the nice adjustment which Nature has set up and the water should not be changed at all. Yet anyone maintaining a balanced aquarium will agree that the question first and most frequently asked is "how often do you have to change the water?" The writer has known per-



YOUNG LONG-EARED SUNFISH IN A BALANCED AQUARIUM.

Smaller specimens of native sunfishes make as attractive aquarium pets as could be desired and are easily kept.



SEA-LETTUCE (Ulva),

It is the best aerator. The red-seaweeds add color and variety and should be placed at the bottom of the tank.

sons who for years had kept aquaria equipped with plants and animals for proper balance, who still thought it necessary to change daily all or part of the water in order to maintain the animal life.

The writer well recalls his own early attempts as a child to keep small native fishes in an aquarium made of a cast-off wash-boiler partially sunk in the ground in the garden, and the ingenuity with which he rigged a small tube to the pump-spout by the horse trough so that when anyone pumped water a small portion would escape for the benefit of the fishes. A few water weeds would have done the work of aeration more successfully and with much less trouble; but the knowledge of the proper method was lacking, and after a number of abortive attempts the experiment was given up in despair. I have no doubt that thousands of persons have had similar experiences with various kinds of fish globes and other improper aquarium apparatus.

Another prevailing notion is, that the small aquarium is simply a plaything serving to amuse the children or to afford an outlet for the energies of an occasional crank; and its only other excuse for existence is found in the fact that the green plants and goldfishes make a bright spot in the room. Even if this were all, who will deny that its existence is justified? But excuses are not necessary. Let it serve for the one as a plaything or bright spot in the room, but for the person who cares to study the life in the aquarium—and there is a constantly increasing number—the aquarium becomes a

piece of scientific apparatus from which can be learned many of Nature's laws that regulate the outside world.

The unbalanced fish globe with its occasional renewal of water is unnatural,—as unnatural as the attempt of a person to live in a closet by opening the door once a day, filling the space with fresh air, then shutting off all ventilation until the next day. The cases, as far as respiration is concerned, are exactly parallel. It is possible to supply oxygen to fishes in the small aquarium by means of apparatus which will pump the air into the water, but this again only meets the problem half way. It supplies the oxygen, but does not remove the carbon dioxide which can escape only by passing into the air at the surface of the water.

The balance of plant and animal life means complete and continual ventilation. Not only is oxygen supplied in sufficient quantities by the plants, but the carbon dioxide given off by the animals in respiration is consumed by the plants in the process of starch making. The adjustment is Nature's own and all animals are adapted to it. Such an arrangement is a pond in miniature and may be used in the scientific study of aquatic life of various kinds. In the majority of cases, to be sure, only goldfishes are kept, in addition to a tadpole or a few snalls and plants.

According to the interests of the aquarist, however, this may be varied indefinitely. Various other attractive exotic fishes of striking colors, form and habits may be readily secured from dealers, or the collector may take up the



GOURAMI (Osphromenus olfax).
This exotic specimen lived for several years at the Aquarium.



COMMON BROOK SUCKER.

A native fish that thrives well.

study of local native fishes, the natural history of which will be found no less interesting than that of the exotic species.

Aquatic insects afford a most interesting and almost infinitely varied field for study, and their habits, metamorphoses, etc., may be most readily investigated by this means. Again, if the aquarist is interested in aquatic botany, he will find here excellent opportunities and means for studying many water plants. Marine life is even more varied than that of the fresh water, and endless opportunities are afforded to those who live within reach of the sea. The microscopist will also find a constantly changing and ever interesting field of research in the minute life of the aquarium.

As an adjunct to the scientific laboratory, the aquarium has become a necessity. Here it may vary in size from the common finger-bowl for

minute animals to tanks for the larger forms. The various aquatic laboratories such as those at Wood's Hole. Massachusetts, and at Naples in Italy, to cite two of the best known, make constant use of aquaria and could scarcely exist without them. Nearly all colleges and universities have some means of maintaining aquaria, usually of the balanced sort, while a few, such as Trinity College, and Pennsylvania and Princeton Universities even possess facilities for the storage and circulation of sea water in larger tanks.

Naturally, larger aquaria have the advantage of supporting a larger and more varied stock, but it should be borne in mind that for scientific as well as for other purposes, the proper adjustment is of far greater value than mere space or variety of life. In the high-school, gradeschool and even in the kindergarten, balanced aquaria have found a place where they encourage nature study among the children. The New York Aquarium has equipped hundreds of these for various schools in New York City.

THE MEANING OF BALANCE.

The factors which govern life in the balanced aquarium are the same as those which obtain elsewhere in nature, with the important difference that certain of them are under control. In fact we may consider the aquarium as a miniature pond in which the conditions of food, temperature and aeration are under the control of the operator. In the natural pond the variations of temperature alone are sufficient to produce important cycles in the balance and in the life of the organisms.

To secure and maintain a balance in the indoor aquarium is the most important problem which confronts the amateur aquarist. Temperature, which is such an important factor in the natural pond, can easily be controlled indoors within the limits which are likely to affect seriously the inhabitants of the aquarium.



YOUNG MIRROR CARP.
The carps are very hardy and are excellent fishes for the beginner.



TERRARIUM IN A ROUND AQUARIUM JAR.

Suitable for small salamanders, frogs and some turtles,
land snails, etc.

Similarly the light factor offers but little difficulty and food can easily be added in the necessary quantities.

The problem of aeration is more difficult. In the natural pond, with its large surface ruffled by the breeze, this takes care of itself, as a sufficient amount of oxygen can be absorbed from the air to supply all the animals that can find food within its waters; but in the narrow limits of the aquarium, with its restricted surface, comparatively greater depth, and the absence of any agitation of the water, the absorption of oxygen at the surface does not take place with sufficient rapidity to sustain much animal life.

To supplement the surface absorption of oxygen, it is necessary to grow plants in the aquarium. It is a well known fact that in manufacturing their own food from simple substances, plants give off oxygen as a waste product. This process takes place in the chlorophyll, or green matter of the plant, and in the submerged plants of the aquarium the oxygen passes off directly by absorption into the water. The fishes are thus supplied with oxygen given off by the plants as waste substance.

Having absorbed the oxygen, the fishes combine it with the carbon of the food to obtain energy, and, in the process of respiration, give off to the water quantities of carbon dioxide or carbonic acid gas as a waste substance. This gas, composed of carbon and oxygen, is absorbed by the plants and the carbon used in the process of starch making, while the oxygen is returned to the water again as a waste substance. Thus the animals and the plants of the aquarium are mutually benefitted, each supplying something that is required in the life processes of the other.

Plants, however, are able to manufacture starch, and consequently absorb carbon dioxide and release oxygen, only when they are exposed to sunlight. It follows then that on dark days the plants have less capacity for aeration than on bright days, and that they yield more oxygen in sunny windows than in dark corners. Moreover they can make starch and consume carbon dioxide and yield oxygen, only during the daytime. Further than this, they consume a small amount of oxygen in their own respiration both day and night, so that at times when they are not engaged in starch making they tend to consume a part of the oxygen of the aquarium, although they use only a small portion of that thrown off during the day. If the water of the standing aquarium is supplied with an excess of oxygen during the day, a considerable amount of the oxygen will remain in solution in the water and aid in proper aeration throughout the night.

It is evident then that an aquarium well stocked with plants will support a larger quan-



COMMON SALT-WATER SHRIMP. They live well in the small aquarium.



STICKLEBACKS.

These miniature fishes are found both in fresh and salt-water. Their nesting habits are especially interesting.

tity of animal life during the day and in bright weather than it will at night or on dark days. The animal life of the standing aquarium must therefore be regulated to meet the poorest rather than the best conditions of oxygen production by the plant life.

Temperature also affects the rate of starch making and consequently of oxygen elimination, as the protoplasm of the plant is more active in a higher than in a lower temperature. However, the fishes are also less active in colder water and consume less oxygen, so that these factors balance each other and temperature does not especially affect the

not especially affect the aeration of the aquarium.

THE AQUARIUM TANK.

Undoubtedly the best kind of a receptacle for the beginner is the oblong, straight-sided aquarium with metal frame, glass sides and slate bottom. The medium size, holding six or eight gallons, will be the best for the beginner. The smaller sizes are difficult to balance and the larger ones are more expensive. For larger aquaria, eight gallons and upward, it is the only type that can be used to advantage. When well set up such a tank will last for years without leaking, and is easily reset, or can often be readily mended by running a little asphaltum or an aquarium cement in the joints. The rectangular, straightsided, all-glass jars are excellent; better in some respects than those with metal frames, for they are not likely to spring a leak.

The glass jars, however, are more likely to crack and so prove an extra expense, but in the hands of the experienced aquarist they are perhaps the most satisfactory for sizes under five gallons. Care should be taken to see that such jars rest firmly and evenly upon their bases, and that they are not subjected to sudden changes of temperature. The cylin-

drical jar with straight vertical sides is satisfactory to maintain, but the inmates appear somewhat distorted through the curved sides. For smaller aquaria the ordinary battery jar is as good as anything, except for the distortion, and has the advantage of being cheap. Very beautiful and well balanced aquaria can often be made with the two-quart size, but these are suitable only for very small animals and few of them.

To test the limits of the capacity of the twoquart size, the writer once kept in such a jar, with plenty of weeds and in good light, a carp



YOUNG TAUTOG.

A very hardy and interesting fish for the marine aquarium.

nearly as long as the diameter of the vessel. The fish continued to live in good condition for several weeks until the experiment was accidentally brought to an abrupt end.

On no account should the ordinary globes be used. They are often sold because of their cheapness, but they give the specimens a very badly distorted appearance, and what is much worse the constricted top affords but a small surface area for exchange of gases with the air and makes it almost impossible to clean the jar properly. The slight additional cost in securing the proper sort of tank will be repaid many times in the satisfaction with which it may be managed.

PLACING THE AQUARIUM.

The aquarium jar or tank should be placed on a firm base where it will not be subjected to much vibration and where it will not have to be moved frequently. Fishes are sensitive to vibration in the water and jarring or moving the aquarium frightens and disturbs the inhabitants. It should not be placed too near a radiator, and if it is near a window it should be carefully guarded from draughts in cold weather. North windows are the most suitable, since sufficient light is afforded for the growth of the plants and the direct rays of the sun, which tend to heat up the water and to over-stimulate the plant growth, will be avoided. If a south exposure is necessary, the tank may be placed farther from the window or it may be shaded from the strong sunlight by a small screen of cheesecloth stretched upon a light frame.

PLANTING THE AQUARIUM.

This is an important proceeding, as upon the successful establishment of the plant growth depends the aeration of the standing aquarium and consequently the health of the animals. Many kinds of aquatic plants, both wild and cultivated, will grow readily in the narrow limits of the aquarium. The best species are those that will live entirly submerged and which have (1) narrow, ribbon-like or (2) finely divided leaves.

In the first class are the tape-grass (Vallisneria), arrow-head (Sagittaria) and pond-weed (Potamogeton); and of the second class, fanwort (Cabomba), milfoil (Myriophyllum), hornwort (Ceratophyllum) and waterweed (Anacharis). Two or three of these plants placed together in the tank give a little diversity and make it more attractive than will a single species. Fine gravel or coarse sand or a mixture of these should be placed in the bottom of the aquarium to the depth of one or two inches, depending upon the size of the aquarium.

The plants can be anchored by packing their roots in the sand or gravel, and if necessary large pebbles can be placed about the bases of the plants until they become firmly rooted, or the lower ends of the stems may be weighted by wrapping with a small piece of soft lead just above the roots. Some aquarists insist that a layer of soil should first be placed under the gravel, but in completely aquatic plants this is quite unnecessary, while the soil is often a source of danger to the animal life through the decomposition of its organic ingredients.

Nearly all of these plants will slip readily and the slips will soon form their own roots if anchored to the bottom by a pebble or a strip of lead. The tape-grass sends out runners, from the joints of which young shoots arise.

To obtain the best results, the aquarium should be planted at least a few days before the animals are introduced. This allows the plants a better opportunity for taking hold of the sand and it also permits them to thoroughly aerate the water in preparation for the animal life.

The plants must of course be provided with



MOSQUITO LARVAE: ALL GLASS AQUARIUM.
This rectangular type of jar can be had in all the smaller sizes and is the best form of the all glass jar. For balanced aquaria, the height should not exceed the width.

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Reptile RAYMOND L. DITMARS. Ried C. WILLIAM BEEBE. LEE S. CRANDALL.

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CHARLES H. TOWNSEND, Director. RAYMOND C. OSBURN, Assistant Director W. I. DENYSE ROBERT SUTCLIFFE a sufficient amount of light or they will not grow, as they are able to manufacture their food only in the presence of sunlight. For reasons stated elsewhere the north window affords the best light for the aquarium. If the plants grow too luxuriantly they can readily be trimmed. Some aquarists prefer to trim off all the parts that come to the surface, thus keeping the plants entirely submerged. There is no doubt that such a method affords the maximum of aeration. since the more the plants are submerged, the less is the opportunity afforded for the escape of oxygen at the surface.

However, many persons prefer the appearance of some plants floating at the surface, and there can be no objection to this so long as there is a sufficient amount submerged. Perhaps the most picturesque, and therefore the most satisfactory, results for the average person are obtained by providing at least two kinds of plants, one like the arrow-head or pond-weed with broad leaves which are allowed to float at the surface, and the other with finely divided leaves (milfoil, fanwort, etc.) kept submerged by trimming. The little duckweed (Lemna sp.) which floats entirely at the surface with its tiny roots hanging straight down in the water for a short distance, makes an attractive addition.

The plants available for aquarium purposes are entirely too numerous to mention here. There are many native species, some of which can be secured in nearly every pond and stream. They are generally annuals and do not live mdefinitely, and the most satisfactory ones are those handled by the dealers, since these are cultivated especially for the purpose. These for the most part have been introduced from the tropics where they flourish perennially.

STOCKING THE AQUARIUM.

The experienced aquarist will naturally know what he wishes and how to secure it. The beginner, in his first efforts to keep an aquarium, should start as simply as possible with only the commoner and hardier fishes and wait until he has proved successful with these before attempting to handle rare or expensive stock. Carps and the ordinary goldfishes known as commons are undoubtedly the best for the beginner within easy reach of a dealer. The highly bred, fancy varieties of goldfishes are less hardy and the same is generally true of the exotic fishes, however attractive they may be. Almost any of the native fishes may be kept easily and will prove interesting and attractive.

Catfishes are perhaps the most hardy, but the various suckers and minnows, as well as young sunfishes, basses, etc., can readily be kept. These can be collected with the aid of a small dip net, and the study of the local species should be much more common than is the case. Why so many people are satisfied to keep ordinary goldfishes when there are so many native fishes of more lively habits and graceful form, is only to be explained by the fact that they give so little trouble and can be bought of a dealer instead of collected at a brook. Of course one can readily understand the attitude of the fish fancier who makes a specialty of breeding the various strains of goldfishes or of keeping rare exotic forms of bizarre appearance or unusual habits.

One serious error into which the beginner is likely to fall is that of overstocking. In his enthusiasm for the fishes and his love for their attractive colors and movements, he places more specimens in his tank than can be readily provided with oxygen. Often, when they are not all affected in a short time, the result may be that they are gradually enervated until the loss of some of them establishes a proper balance of the animal and vegetable life. Until the management of the aquarium is thoroughly mastered, the rule should be to keep well under the limit of animal life.

It is difficult to lay down any hard and fast rule for this, because the number of fishes that can be kept depends upon their size and kind as well as upon the proportions of the tank and the amount of plant life in good thrifty condition. It may be stated that the beginner will do well to supply only a couple of fishes three or four inches long to an aquarium of five or six gallons of water when the plants are in good condition. When he is well enough acquainted with the habits and appearance of his fishes, he will be able to know at once when his tanks are overstocked before any losses take place.

There are, of course, many sorts of animals besides fishes that are adapted to aquarium life. The tadpoles, larvae of frogs and toads, are easily collected in any pond, or some of them may be purchased from dealers. In addition to their interesting habits they are useful scavengers, but unless they are large it will not do to introduce them into the aquarium with carnivorous fishes. In early spring the eggs may be collected and reared. Those of the frogs are laid in gelatinous masses, those of the toad in long strings.

Of the numerous salamanders, the pale axolotl and the common mud-puppy (Necturus) both of which have external gills, are easily kept. The most attractive of the salamanders is the common or spotted water newt (Diemictylus virides-

cens). These beautiful and graceful little animals, although without gills, live well in the aquarium, since they are able to absorb sufficient oxygen through the skin, or may occasionally rise to the surface and fill the sack-like lungs with air. They swim readily with the limbs folded against the sides, or they climb with ease among the vegetation. They are carnivorous and are best fed on mealworms and pieces of earthworms. The eggs of the mud-puppy can often be obtained in large masses in ponds in early spring, and the larvae may be reared as easily as those of the frog, but the eggs of the newt are laid singly among water plants.

Young turtles are interesting, but the most of them are better adapted to terraria than to the ordinary aquarium as they need to have some way of climbing out of the water. The soft-shell or freshwater leather turtle is more aquatic than other species and does not need to climb out, but must have loose sand in which it occasionally buries itself. It is carnivorous and feeds well on earthworms, mealworms and pieces of fresh meat.

Young alligators are frequently brought from Florida, but it should be made a punishable offense to do so, for sooner or later they die unless special care is taken to provide them with heat and sonlight. The New York Aquarium is the recipient annually of many of these little fellows, usually in an emaciated condition because they have not fed well, and many of them do not recover, even under the care of an expert aquarist. They should be considered strictly hothouse pets and handled accordingly.

The temperature of the ordinary living room in winter is too low for alligators as they require 80° to 85° for their best development and should not be allowed to drop below 75°. Below this temperature they become sluggish and chilled and refuse to eat. If kept warm enough they will feed well on a varied meat diet consisting of fish, crayfish, earthworms, frogs, etc., alive or dead, or they will take fresh beef. The majority of the water turtles are also carnivorous and may be given the above mentioned food, but the diet should be studied, as the different species vary somewhat in this respect. The same conditions of temperature should be applied here as with the alligators.

The pond and river species of crayfishes are well suited to the small aquarium. Those from the mountain streams and cold springs are harder to keep on account of the difficulty of maintaining a sufficiently low temperature during the warm months. They should not be kept with fish smaller than themselves, for they some



BALANCED SALT-WATER AQUARIUM.

Here are shown ulva and red seaweed, sea-anemones, ascidians, shrimps and snails.

times make too good use of their large pincers. They should be provided with some sort of a retreat in the form of rockwork or stones under which they can hide part of the time on bright days, as they are more or less nocturnal in habit. some species will climb readily among the water weeds. They are naturally scavengers and will eat almost anything, but prefer a meat diet.

There are numerous aquatic insects which can readily be kept in the small aquarium and which offer a very attractive field for study. Of those available in the adult stage may be mentioned the hard-shelled water beetles (Dytiscus, Hydrophilus) and the whirling beetle. The waterbugs such as the oarsman and the electric-light

bug (Belostoma) are among the commoner and larger of the true bugs. The larvae of the dragon-flies, caddisflies and the dobson or helgramite are even more interesting and may be kept until they emerge in the adult winged condition. These forms are chiefly carnivorous, and if kept together the smaller may disappear into the rapacious stomachs of the larger. The dragon-fly larvae are even cannibalistic and unless provided with enough food the larger may devour the smaller, even of the same species. Any of the above forms may be readily collected with the

aid of a small dip-net. While their study has been chiefly confined to the entomologist, they will amply repay the labors of the aquarist.

FEEDING.

In the selection of food, one must naturally be governed by the needs of his animals—some species are partly or entirely herbivorous while others are carnivorous. Practically all of our native fishes are carnivorous and thrive best upon a meat diet of some sort, while the goldfishes and carp are largely vegetarian in their diet. Prepared fish foods may be obtained from a dealer in aquarium supplies,

and he may be consulted as to that best adapted to a particular species of fish. In the case of carnivorous fishes, the prepared dry food may be supplemented occasionally by the addition of mealworms or of earthworms cut into small pieces according to the size of the fish. Special care should be taken, however, that such animal food is removed if not eaten as it decays much more readily than vegetable matter and so causes greater danger of pollution.

To prevent the dry prepared food from becoming scattered over the surface of the aquarium, it is advisable to make use of a floating glass ring which can be secured from a dealer. This not only gives the surface of the aquarium



COMMON ROACH IN A BALANCED AQUARIUM.

A very graceful and attractive species.



YOUNG CATFISH.

The local species of catfishes are hardy and interesting. They are excellent for the beginner.

a neater appearance after feeding time, but prevents the escape of smaller particles to contaminate the water. Care in the matter of feeding is of the utmost importance in preserving the balance of the aquarium and in keeping the animals in good condition. It must be remembered that the usual fault is that of overfeeding and the conditions should be studied carefully.

CLEANING THE AQUARIUM.

It must be clearly borne in mind that cleanliness is absolutely necessary to the welfare to

the inhabitants of the aquari u m . Contamination c a n arise only by bacterial decay of organic substances allowed to remain in the water. There are three general sources of such organic matter; First, fecal matter from the animals, relatively unimportant because the deposits are small in amount and regular in occurrence; second, decaying vegetable matter from dead portions of the plants, also relatively unimportant since in the well balanced aquarium there is little tendency for the death of the plant tissues. and third, decay of excess food matter, the usual source of pollution.

It is a common but very mistaken notion that an anim al should have food at hand at all times to keep it in good condition. It is well known that various forms of domestic animals, as well as the wild species confined in zoological gardens, make the best growth and keep in the most satisfactory condition when supplied only with what food they will clean up at one feeding. This applies with equal force to the inhabitants of the aquarium, but besides there is a real and grave danger of contamination in supplying more food than will be readily consumed.

The first indication of serious pollution is a slight clouding of the water caused by the presence of countless

millions of bacteria. This may go on until the water is of a milky color and the balance of the aquarium is completely upset by the accumulation of sulphur and ammonia compounds set free in the water by bacterial decomposition. How can the accumulation of dead matter be prevented? The usual means is to introduce some animal that will act as a scavenger to clean up refuse matter. The forms generally made use of are the tadpoles and fresh-water snails.

Either of these under ordinary circumstances



SOFTSHELLED TURTLE.
Small specimens are well adapted to the aquarium.



MUDFISH OR BOWFIN.

This is one of the hardiest of fresh-water fishes, but adult specimens are too large for small aquaria.

will clean up waste particles of food and decayed vegetation and work over the fecal matter of the fishes, and will also tend to prevent an excessive development of the microscopic plants which form a green scum on the glass. If larger portions of plants begin to deteriorate it will be found best to cut them off and remove them since if they are not in good condition they will not serve for aeration and will become a source of danger.

If care is taken in feeding—and a little study and experience in this matter is the only safe guide—no appreciable amount of food need be left to decay. If for any reason not all of the food is consumed or if there is any accumulation of fecal or other matter, these may be readily removed by means of a long pipette, or a rubber tube used as a siphon. For the small aquarium the pipette with an inside diameter of

one-quarter inch and fitted with a large rubber bulb, is most convenient, or, the tube may be used without the bulb by placing the thumb over the upper end while introducing it and while withdrawing it after it is filled.

For larger aquaria the pipette is rather tedious and the siphon is recommended. In either case the water should be strained through a cheesecloth net and allowed to flow back into the tank rather than to add fresh water to replace it. As has been stated elsewhere, the less changing of the water the better, for fear of intro-

ducing some new factor to interfere with the adjustment already established. It will occasionally be necessary to add water to replace that which escapes by evaporation. This should be done a little at a time and care should be taken to have the temperature the same as that of the water in the tank.

For the purpose of removing any deposits on the glass of the aquarium, a swab can be made out of a stick with a bit of cheesecloth wrapped about the end. The cloth may be removed each time

it is used, which should not be more often than is necessary to keep the glass reasonably clean, or if it is used over it should be carefully cleaned and sterilized each time in hot water. The swab will serve not only to remove ordinary dirt, but also the green scum of the minute plant life which in strong light will soon cover the glass. These minute plants do no harm-in fact they are as beneficial in yielding oxygen as are the larger ones-and they are a natural part of the balanced life of the aquarium. However one keeps an aquarium to enjoy the view of its miniature water world, and if the green scum interferes with the view it may be removed without detriment to the adjustment. The scum grows thickest on the side nearest the light and it may be allowed to develop on that side as it will serve to screen the strong light somewhat from the animals.



THE SIREN.

This salamander has the legs reduced to mere vestiges. Young specimens are well suited for life in the small aquarium.

For removing inanimate objects from the aquarium or for readjusting them, a strong pair of wooden forceps is advisable. The hands should not be put into the water and on no account should the fishes be taken into the hands. If it becomes necessary to remove the fishes a small net of cheesecloth should be employed, and great care should be taken not to injure them by loosening their scales, as any such abrasion offers a foot-hold to the deadly fish fungus (Saprolegnia).

MARINE AQUARIA.

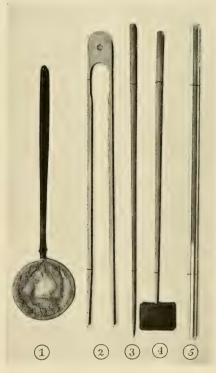
As most of what has been said of the fresh water aquarium will apply with equal force to the salt water aquarium, a detailed account will not be necessary. The factors governing life are the same in both. The best plants for aerating are the species of green algae known as sealettuce. The common broad-leaved form is usually best arranged by floating at the surface by a few small pieces of cork in such a manner that portions of the leaves will extend downward into the water. The species of marine plants are numerous and the various red, green and brown forms with strap-like or with finely divided fronds may be placed at the bottom to give variety and color, as well as to aid in aerating the water. Very often pebbles with these plants attached may be secured in shallow water.

Unfortunately the salt water aquarium is a practical impossibility for most persons who are unable to make occasional visits to the shore. Artificial sea water can be easily prepared at a trifling expense, if the formula of Gosse is followed: chloride of sodium (common table salt) eighty-one parts, chloride of potassium, two parts, chloride of magnesia, ten parts, sulphate of magnesia (Epsom salts) seven parts, total 100 parts. A pound of this mixture is sufficient to make about three gallons of artificial sea water. It should be filtered before placing in the aquarium.

To be sure, natural sea water contains many other salts, but they have been found unnecessary for the animal life of the aquarium and may be neglected. The sea water part of the problem is thus readily solved, but very little marine life is ever handled by dealers in this country and the difficulty of obtaining animals and plants renders the salt-water aquarium impracticable for the person of average means who lives at a distance from the sea.

To one who is within reach of the sea, however the marine aquarium offers a never ending and ever varied field for study and investigation. Animals and plants may be obtained the year round, and many of them live well within the restricted limits of the aquarium. The many species of hydroids and sea anemones, marine worms, bryozoans, mollusks of many kinds, crabs, shrimps and other crustaceans, sea squirts or ascidians, as well as fishes are to be obtained and give a variety to the miniature scene which cannot be paralleled in the fresh water aquarium.

Some of the small aquaria at the New York Aquarium have been maintained in a balanced condition for several years—one for as long as twelve years. Of course both animals and plants have been occasionally added to the stock, but the balance has not been interfered with during that time. Fresh water in small quantities must occasionally be added to the marine aquarium to replace that which evaporates. The addition of sea water would, in the course of time, cause the salinity to become too great, since the salts do not evaporate.



IMPLEMENTS OF USE TO THE AQUARIST.



PORTABLE METAL FRAME AQUARIUM.

A useful tank in all sizes and the only kind that is satisfactory for larger sizes above eight or ten gallons.

Special care should be taken, whenever any new animals are added, to observe that they do not die and upset the adjustment of the aquarium by their decomposition. Portions of plants which are deteriorating may be removed and fresh ones added. Practically all of the marine animals are carnivorous. They may be fed upon pieces of clam, oyster, or fish, cut to proper size or finely grated for the smaller animals.

Sea snails make good scavengers, but some of them are vegetarians and may attack the plant life too freely. However, these are just the points which the aquarist will be interested in determining for himself, and, with the proper attention, will offer no great difficulties. As in the fresh-water aquarium, it is very important not to overfeed and to remove by means of the siphon any excess food material which might by decaying interfere with the proper balance of life.

AQUARIUM SOCIETIES.

Interest in the small aquarium has been so sporadic in this country that there has been thus far little tendency for the formation of aquarium societies. In some of the European countries, notably Germany, such societies are very common. At present there are but four in the United States, as far as the writer has been able to learn, though there should be one in every city. The members have an opportunity to talk over their difficulties and successes, to exhibit and exchange specimens and to discuss the various phases of this field of natural history.

The Aquarium Society .- This organization,

which originated first as the Salamander Society, d at e s from April 13, 1893, when it was formed for mutual benefit by five enthusiastic aquarists in the Bronx. The society flourished under this name for several years, holding meetings in the Bronx, New York City and Jersey City, but in December, 1896, was reorganized under the present name.

The society now enrolls about sixty active members. Meetings are held twice a month, alternating between the American Museum of Natural History in New York City, and the German-American School in Jersey City. An annual exhibition, which arouses considerable outside interest, is held for

a week in November.

The members of the society are chiefly interested in exotic fishes, with the exception of gold-fishes, comparatively few of which are kept. Mr. Isaac Buchanan, 143 Liberty Street, New York City, is the President, and the annual membership fee is \$2.00.

The Aquarium Society of Philadelphia.—This Society, organized May 5, 1898, and reorganized in January, 1900, has 125 active and ten corresponding members and is the largest of the American societies.

Meetings are held the fourth Wednesday of each month, May to August excepted, at Fraternity Hall, 1414 Arch Street, Philadelphia, Pennsylvania. The society specializes in gold-fishes, particularly fringe-tailed telescopes and fringe-tailed Japs. Exhibitions are held at each meeting. Some of the competitions are: best goldfish owned by member; best fish raised by member; best household aquarium; telescopes over one year; fringe-tails over one year, etc. The society has not issued any publications, but has contributed to The Guide to Nature. Dues, \$1.80 per year. President, Mr. William T. Innis, Jr., 1311 Sansom Street, Philadelphia, Pennsylvania.

Brooklyn Aquarium Society.—Organized in February, 1911, this society has already fifty members and is growing rapidly. In May, 1911, the first number of the Brooklyn Aquarium Society Bulletin—the first and only such journal to be issued by any society in America—appeared. Thus far the society has held no

public exhibitions. There is no attempt to specialize in any one line, but goldfishes and exotic fishes are the rule. Meetings are held every second Tuesday, June to August excepted, at the headquarters, Fairchild Building, 702 Fulton Street, Brooklyn, N. Y. The President of the society is Mr. W. F. DeVoe, Baldwin, N. Y. The dues are \$2.00 a year.

Chicago Fish-Fanciers Club.—Organized in February, 1911, this society has twenty-six members interested in all kinds of aquatic life. Meetings are held twice a month, but no special exhibits have thus far been held. Mr. F. S. Young, 428 West 66th Street, Chicago, Illinois,

is president.

AQUARIUM JOURNALS.

The first American periodical dealing especially with this phase of natural history was published by Hugo Mulertt under the title The Aquarium and made its appearance in Cincinnati in October, 1888. Two volumes were issued as a monthly. Apparently publication was suspended for a couple of years for we find volume III beginning as a quarterly, published in Brooklyn (still under the direction of Mr. Mulertt) in October, 1892. In this form it continued to be issued as a very creditable journal until 1897.

Since that time there has been no periodical dealing especially with this field until May, 1911, there appeared the Brooklyn Aquarium Society Bulletin, issued as a monthly (June to August excepted) and continuing to the present time.

We are now informed that the New York, Brooklyn, Philadelphia and Chicago Societies have combined in a project to issue a monthly journal, The Aquarium, to be published in Philadelphia (Innes & Sons, 1311 Sansom Street) at a dollar a year. The editorial staff will be composed of members selected from each of the societies. The Brooklyn Aquarium Society Bulletin will thus be superseded by a journal of much wider scope. There would seem to be ample room for such a periodical, and with the combined support of the various societies there should be nothing to interfere with its success.

BOOKS FOR THE AQUARIST.

The aquarium student will naturally be interested in obtaining all the information he can in regard to his animals and plants. For such information he will find it advisable to read widely. The list of works given below embraces only such as are contained in the New York Aquarium library, all of which can be recommended to the amateur aquarist. Most of those issued by

American publishing houses are still to be obtained from booksellers. A few are out of print, and may be obtained only from second-hand dealers. Some of the older, classical books are included, and a few that deal with the life of animals and plants in fresh and salt waters.

OLDER WORKS.

The Aquarium.—An unveiling of the wonders of the deep sea, with colored plates. By Philip Henry Gosse, A.L.A. Van Voorst, London, 1854.

Popular History of the Aquarium of Marine and Fresh Water Animals and Plants.—With colored plates. By G. B. Sowerby, F.L.S. Reeve, London, 1857.

Ocean Gardens.—The history of the marine aquarium, and the best methods now adopted for its establishment and preservation. With colored plates. By H. Noel Humphreys, Samson Low Son & Co., London, 1857.

The Aquarium Naturalist.—A manual for the seaside, with a chapter on aquaria. Colored plates. By Thos. Rymer Jones, F.R.S. Van Voorst. London, 1858.

The Fresh and Salt Water Aquarium.—With colored plates. By Rev. J. C. Wood, M.A., F.L.S. Routledge & Sons, London, 1868.

The Family Aquarium.—The construction, stocking and maintenance of fresh water and marine aquaria. By H. D. Butler, Dick & Fitzgerald, New York, 1858.

RECENT WORKS.

The Amateur Aquarist.—How to equip and maintain a self-sustaining aquarium. Illustrated. By Mark Samuel. Baker & Taylor Co., New York, 1894.

The Aquarium.—Its inhabitants, structure and management. Illustrated. By J. E. Taylor, Ph.D. New Edition, Grant, Edinburgh, 1901.

The Book of Aquaria.—Being a practical guide to the construction, arrangement and management of fresh water and marine aquaria. Illustrated. By the Rev. Gregory C. Bateman, A.K.C., and Reginald A. R. Bennett, M. A. Part I, Fresh Water Aquaria, Part II, Marine Aquaria. Scribner's, New York, 1902.

The Home Aquarium, and How to Care for It.—A guide to its fishes, and other animals and plants, with many illustrations. By Eugene

Smith. Duttons, New York, 1902.

The Fresh Water Aquarium and Its Inhabitants.—A practical guide, describing especially the plants and animals suitable for aquarium purposes, and with chapters on feeding and fish diseases. Illustrated by E. F. Keller and E. R. Sanborn. By O. Eggeling and F. Ehrenberg. Holt & Co., New York, 1908.



COMMON NEWT.

One of the most abundant of the local salamanders and the one best adapted to the balanced aquarium.

Das Süsswasser-Aquarium.—A practical guide in the German. Illustrated. By Dr. E. Bade. Fritz Pfennigstorff, Berlin, 1909. Can be obtained through dealers importing German books.

GOLDFISH CULTURE.

The Goldfish and Its Systematic Culture.—A thorough guide for goldfish keeping and goldfish breeding in the house and out of doors. The construction and care of the parlor aquarium and of ponds for breeding. Illustrated. By Hugo Mulertt, New York, 1902.

Goldfish Breeds and Other Aquarium Fishes.

—Their correct propagation. A guide to fresh water and marine aquaria, their flora, fauna and management. Illustrated. By H. T. Wolf. Innes & Sons, Philadelphia, 1908.

Japanese Goldfishes, Their Varieties and Cultivation.—A practical guide to the Japanese methods of goldfish culture for amateurs and professionals. Illustrated, with numerous colored plates. By H. M. Smith, U. S. Deputy Commissioner of Fisheries. W. T. Roberts Co., Washington, 1909.

VIVARIA.

The Vivarium.—Being a practical guide to the construction, arrangement and management of vivaria. Illustrated. By Rev. Gregory C. Bateman, A.K.C. Gill, London, 1897.

NATURAL HISTORY.

Ponds and Ditches.—A description of the plants, animals and conditions of life in quiet fresh waters. Illustrated. By M. C. Cooke. E. & J. B. Young & Co., New York, 1885.

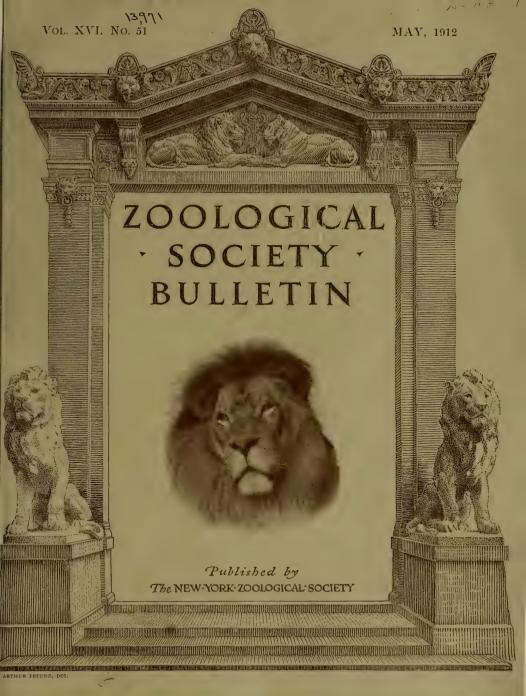
Ocean Wonders.—A companion for the seaside. With a chapter on marine and fresh water aquaria. Illustrated. By William E. Damon. Appleton's, New York, 1896.

Life in Ponds and Streams.—With a chapter on aquaria. Colored plates. By W. Furneaux, F.R.G. Longmans, Green & Co., New York, 1896.

The Sea Beach at Ebb Tide.—A guide to the study of the sea weeds and the lower animal life between tide marks. Illustrated. By A. F. Arnold. The Century Co., New York, 1901.

The Sea Shore.—Dealing with marine animals and plants and with a chapter on the salt water aquarium. Illustrated. By W. S. Furneaux. Longmans, Green & Co., New York, 1903.

Sea Shore Life.—The invertebrates of the New York Coast (Vol. I. New York Aquarium Nature Series). 181 pages and 119 illustrations. By Dr. A. G. Mayer. For sale at the Aquarium and by A. S. Barnes and Company, New York.



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ZOOLOGICAL SOCIETY BULLETIN

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SIBERIAN TIGER

ZOOLOGICAL SOCIETY BULLETIN

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NUMBER 51

THE WIDE-HORNED WHITE MOUNTAIN SHEEP

By WILLIAM T. HORNADAY

RECENT hunting trips to Yukon Territory made by Wilson Potter and Henry Disston, Jr., of Philadelphia, resulted in the discovery by them of the most remarkable White Mountain Sheep specimens that (so far as known) have come out of northwestern America. The species represented is Ovis dalli, but the fact revealed by the specimens is new and startling. At the last moment before closing this manuscript, the National Collection of Heads and Horns received, as a gift from Frederic H. Osborn, of New York, a nephew of President Osborn, an Ovis dalli head that unmistakably belongs in the same class as the Potter-Disston specimens.

The ordinary horn architecture of the white sheep, as found in Yukon Territory and eastern Alaska, and also in the Kenai Peninsula, is quite well known. Described in a few words, it is essentially a refined and compacted version of the standard horns of the Rocky Mountain Big-Horn, with the addition of long, slender points that sometimes abruptly thrust outward from the face. Sportsmen call it a close spiral, because, instead of opening out widely from the face, the middle section of the horn descends almost parallel with the cheek, and not far away. Not infrequently, however, a white-sheep horn of extreme length will thrust a long, slender point outward almost at a right angle with the face. Occasionally, also, a black mountain sheep develops horns of great spread in proportion to their length, but such cases seem to be exceptional. The proposition that wide-spreading horns constitute a distinguishing character of the black sheep species has been strenuously denied. Thus far no locality, so far as we are aware, has developed a common type of widely spreading horns, even of the black sheep.

The specimens under consideration are remarkable because of the fact that they represent a horn type never before seen by the writer in Ovis dalli, either as a distinct local type or otherwise, and also because there are so many of them (from the same locality) that they compel attention. Their unusual size may be mentioned as a third feature of interest.

The series of specimens consists of six mounted heads, and while they have not been all cast in the same mold, their characters are fairly uniform. Without descending for any distance parallel with the cheek, these horns spread outward, continuously, until at least four of the six acquire tip-to-tip proportions and openness of spiral that are remarkable for Ovis dalli. In general terms, Mr. Potter's No. 1 is a fairly exact counterpart of a fine head of Ovis karelini in the National Collection of Heads and Horns, which measures in length 44½ inches, spread between tips 36 inches, and in circumference 134 inches.



HEAD No. 1(Mr. Wilson	Potter)	
Spread, tip to tip	Inche	
Length on curve		
Circumference at base		

HEAD No. 2-(M)	٠.	Н	611	rs	7	Di	ss	to	n, Jr.)
									Inches
Spread, tip to tip									. 301/4
Length on curve									. 371/4
Circumference									. 141/8
Arro								6	vents

HEAD No.	3	_	(M	r,	H	еп	ry	. 1)î:	ssi	to	n,	Jr.
												In	ches
Spread, tip	1	0.	tip										271/2
Length on	C	ur	ve										101/2
Circumfere	en	ce											131/2
Age											7	37	ears

HEAD No. 4-(Mr.	Henry	Di	sst	on, Jr.)
Spread, tip to tip . Length on curve				Inches . 26½ . 38½
Age .			. 7	years

KARELIN SHEEP.

Ovis karelini, (Severtzoff).

													ich	
Spread	, ti	p to	tip	١.									36	
Length	01	ı cu	rve										44	1/2
Circum	fe	renc	е.										13	Ļ
I	,00	·.—C	hin	es	e '	Τì	ırl	ke	st	ar	١.			
Head i	n	the	Na	ti	on	al		Co	11	60	ti	01	1	0
		Her	nds	ar	d	H	o	rn	s.					

HEAD No. 5-Mr. F. H. Osborn's Gift to N. C. H. H.

					Inches
Spread, tip to tip					. 29
Length on curve					. 4138
Circumference .				٠	. 141/4
Age				8	years

WHITE MOUNTAIN SHEEP.
Typical Specimen, showing the ordinary close spiral.
Head in the Reed-McMillin Collection.
National Collection of Heads
and Horns.

REAR VIEW OF HEAD No. 1. (Mr. Wilson Potter)

All the heads shown in this article have been photographed and reproduced as nearly as possible on the same scale.



SHEEP HEADS SHOWN FOR COMPARISON

The specimens under notice at once strike the observer as representing something new in the horns of American mountain sheep. A single specimen, even of an extreme type, would readily be accepted as an individual or freak development; but with six specimens, practically from the same locality, and another one coming greater than any in hand, it is in order to look seriously into the question that they present. The following comparative measurements are of interest, because they represent four localities and are strictly comparable, all being selected heads.

OVIS DALLI HORNS, SPREAD BETWEEN TIPS, (in inches).

1.	The Wide-Horned heads:	311/2	301/4	271/2	261/2	29
2.	Charles Sheldon's heads, Ogilvie Mts.	2.5	23	17½	17	17¾
3.	Charles Sheldon's heads, Pelly Mts.	201/4	1813	171/4	171%	171/4
f.	Reed-McMillin heads, Kenai Penin.	2358	205%	19".	1913	30½ s

THE SAME HEADS, LENGTH ON CURVE.

1.	The Wide-Horned heads	I	443/4	371/4	413%	I	38½	$40\frac{7}{2}$
2,	Sheldon heads, Ogilvie Mts.	I	$29\frac{1}{2}$	30	27	1	3658	32
3,	Sheldon heads, Pelty Mts.	1	$38\frac{1}{2}$	32	351/8		283/4	36¾
4.	Reed-McMillin, Kenai Penin,	ı	311/2	36	3838		351/8	365:

It is not often that the measurements of skulls or horns tell a story as striking as that revealed by the measurements of the four groups of heads set forth above. It seems hardly necessary to write down the conclusions they at once suggest; but at the same time it may be well to do so.

These four groups of heads represent four widely separated localities in the range of Ovis dalli. On a map of northwestern America the Kenai Peninsula, Ogilvie Mountains and Pelly Mountains form a great triangle, near the center of which is the locality which furnished the five wide-horned sheep heads here noticed.

The measurements show that the fifteen specimens composing Groups 2, 3 and 4 are not noticeably different from one another. They do not spread widely, and they are by no means particularly long. In fact, they are all of the same general type—small, of medium length, and close in spiral.

The five specimens in Group No. 1, are equally alike, but their great spread, great length, and wide-open spiral place them absolutely in a class by themselves. As yet we do not know the western limit of the wide-horned

sheep, but we venture the prediction that an investigation of all the wide-horned *Ovis dalli* ever sent out of the Northwest will reveal the fact that they have come from Southwestern Yukon Territory, or northwestward thereof, in the direction of Mount McKinley.

After an examination of these specimens, the question naturally arises, what do they mean?

Distinctly, I think they do not represent a new species, nor even a sub-species. It is reasonably certain that as the collector progresses outward from the locality of the Disston-Potter series, a complete series of intermediate horns will be found, grading down to the standard form of close-spiral horn architecture as found in Ovis dalli generally throughout the best-known ranges of that species.

It is, however, my belief that in the locality which furnished the wide-spreading horns described above, we have found Nature virtually in the very act of developing and striking off a wide-horned and long-horned sub-species of Ovis dalli. Having hazarded a guess that these sheep were developed in a region where sheep food was particularly abundant and rich, Mr. Potter immediately replied:

"Yes; that locality is on the eastern slope of the main range, where spring comes early, and the food for sheep is the finest that I ever saw."

Under such conditions, it is not at all difficult to imagine that in 200 years of quiet and uninterrupted breeding, carried on by the fittest of such rams as these, the result might easily be a new species closely paralleling Ovis karelini, and larger every way than Ovis dalli.

As conditions of slaughter are to-day, the locality which produced these sheep will be invaded and shot to pieces by an eager army of sheep-hunters, just as soon as its name is made known; and thus Nature's last attempt at species-making in American sheep will come to an untimely end. As this breed disappears, and, at least while we are bidding it farewell, we will call it the Wide-Horned White Sheep, locality Yukon Territory.

Duck Collection.—The collection of ducks now installed on the Wild Fowl Pond is unusually complete and will well repay inspection. There are about 350 specimens of some twenty-three species, including several of the diving ducks of the genus Marila. All of the males are now in full nuptial array and present a much more striking appearance than will be the case later in the summer, when many take on the eclipse plumage.



EVERY BRANCH TREMBLES WITH THE WEIGHT OF VULTURES

An Adjutant is Perched on a Bough in the Center Picture

THE SCAVENGER BIRDS OF INDIA

By C. WILLIAM BEEBE
Curator of Birds

We who enjoy the comforts of Western civilization, seldom give a thought to the perfection of operation and concealment of our vast sanitary and other systems. Occasionally the intricate lines of sewers, the mighty water-pipes, the mesh-work of electric wiring are laid bare in our streets; all that necessary subterranean plexus which makes life pleasant or possible in our great cities. But to realize that there are lands where, between scores of millions of human beings and the most dread diseases due to unsanitary conditions, are bulwarks only of hosts of feathered beings, great and small, is a new thought, and one which should abate every feeling except of interest and appreciation.

Even before one's steamer comes within sight of the low marshy shoreline of India, there is evidence of the bird seavengers of that country. Hardly have the propellers begun to churn up the muddy water of the Hoogly, many miles from land, than gulls of several species come screaming toward the vessel and from thence

onward every port-hole, every motion of the passengers is kept under surveillance, until a stray bit of bread or other refuse draws the flock downward in swift spirals to the water.

Gulls in this rôle are familiar even in our New York harbor, but when we enter the Hoogly itself a new element is introduced, the kite—the Brahminy kites with their long graceful wings and deep cleft tail, clad in strongly contrasting hues of white and rich chestnut, and the less conspicuous brown pariah kites of the city itself. These birds are adapted both in swift flight and grasp of talons for a life of pursuit and capture of living creatures, but they have chosen the easier method of livelihood in this land teeming with mankind, of subsisting upon refuse. Our country is not without a parallel, for along the

*These notes were made chiefly in the vicinity of Calcutta and Rangoon. The birds mentioned are the following:—Brown-headed Gull—Larus brunneicephalus; Brahminy Kite—Haliastur indus; Pariah Kite—Milivus govinda; House Crows—Corvus splendens and insolans; Jungle Crow—Corvus macorhynchus; White-backed Vulture—Pseudogyps bengalensis; Adjutant—Lertoptius dubius.



A HUNDRED VULTURES FLAP TO THE FEAST



A STRUGGLING PILE OF BIRDS

shores of Maine and Nova Scotia it is not an uncommon sight to see the bald eagle itself walking ungainly about in search of the refuse of the fishermen. The kite of India has brought unusual facilities to aid him in his new field, and the more we see of him the more we admire the savoir-faire which he shows in his mastery of the water, the earth and the air. One never tires of watching these birds about the harbors. now soaring, now perching upon the rigging, now swooping to the surface and with wings and tail lifted, daintily seizing some morsel with their talons. A few flaps then take them upward and give such impetus that the feet may be stretched forward to meet the beak, when the bird procoeds to feed as calmly and leisurely as if the process of flight needed no supervision, the wings and tail apparently taking care of themselves. supporting and steering their owner safely until the last bit of food is swallowed, when the faculties of the head again assume command.

In the city itself-Calcutta or Rangoon-the Brahminy is not seen, the brown pariah kite holding sway as best he can against a new rival, the house crow. Much has been written of this latter bird but still more remains unsaid. As the two kites have each found their niche in life, so the guilds of house and jungle crow keep more or less to their appointed zones of influence. In comparison with the house crows of India, our English sparrow is wariness itself. The crows will enter one's very room at the hotel in search of food, and when dining on an outside balcony, if a table is left unguarded for a moment, a black-winged arrow descends straightway upon toast or butter and bears it off in triumph before the turbaned waiters can move a step. The house crow is trim and sleek, pleasant to look upon and with a brain which has few equals among the class of birds.

As we leave the heart of the city, the superiority of the crows diminishes, giving way to the greater brute force of the pariah kites and dogs, but it is not until we reach some suburb that we enter the realm of the greatest of all scavengers, the great vulture host of India. Unlike all the lesser factors in this field of usefulness, these great birds ply their trade with the least amount of effort; in fact, even a keen observer of bird life, might travel in India for many scores of miles without seeing a single vulture. But at the appointed time and place, no more wonderful sight awaits the ornithologist than the gathering of these clans.

When near a large Indian city, one treads some great road like that which delighted the heart of Kim, there comes to the ear the loud call of mynas, and the harsh notes of magpies or rollers; a distant crow may give voice or a kite squeal from a house-top. The sky is clear, blazing blue, marred by neither cloud nor the form of any bird. A horse or bullock falls by the roadside and is surrounded at once by a shouting, gesticulating crowd of natives. A crow flies over and adds his shout of approval to the uproar, thereby summoning all of his clan in the neighborhood.

Later the stricken animal is carried away to some spot set apart for the city refuse, but long before it has reached its destination a great shadow passes and with a loud rush of wings a huge brown form swoops low overhead and swings up to the topmost branch of a dead tree. A glance upward shows the sky full of vultures all descending swiftly in great spirals focussed upon this single speck of earth. Dozens are close at hand, scores of others afar off, while the straining eye discovers, now here, now there. still more coming constantly into sight, at first the least of motes against the blue, then taking form and motion, and finally assuming the individuality of species. Every branch of every nearby tree is atremble with impact after impact of the great weight of bodies. Finally when every available arboreal space is occupied, the walls are filled. The living fringe of crows which tops the walls becomes gradually replaced with vultures. When the last perch is filled, the latecomers are compelled to settle in the open fields, forming densely packed mobs of several hundred birds—standing room only. Always the kites, which have collected in numbers, weave an intricate aerial net-work over the fields and in and out among the trees; they too, with the crows, must abide their time. A disturbance in one of the trees draws attention to an adjutant which has alighted on several of the vultures, when gently but firmly seizing their necks in his great beak, he tumbles them without injury off the branch to make room for himself. He represents another link in the endless chain of bird scavengers in this land, and as the kite has deserted the more noble proclivities of his aquiline kindred, so the adjutant has abandoned the clean feeding of the storks to join the vulturine profession. With beak and wings he forces his way to the perch, but for many minutes the attacks of all his neighbors render his position uncertain, until the attention of the combatants is distracted by the approaching object of their desires.

Not a bird moves while the dead animal is brought to the center of the waiting host, and only the hundreds upon hundreds of craning necks and unwinking eyes express the pent-up eagerness, the unappeasable hunger which a vulture seems ever to typify.

I shall never forget the impression which this scene made upon me; the hosts of lesser folk, crows and mynas, cawing and screaming; the scores of kites squealing their loudest, and finally the great silent, intent host, line upon line, crowd upon crowd in every direction.

As the last native walks way, a vulture upon the topmost bough leaps from his perch and with all his might flaps toward the feast; ten. a score, a hundred follow at his very tail and the scavengers are at their work. There is nothing unpleasant or revolting to the eye. From the moment the first vulture alights on the carcass until the last bird flaps reluctantly away from the clean-picked bones, nothing is visible but a struggling pile of birds, two, sometimes three deep, with dozens constantly leaving, and their places taken at once. Men who have witnessed such scenes dozens of times. say that a horse or bullock will be completely devoured within nine to eleven minutes after the first vulture arrives. When the vultures have done, the crows consume every remaining scrap, and the bones await whatever use the needs of mankind require. Thus swiftly does the beast of burden fulfill its physical reincarnation in these eastern lands, and thus is wrought safety for millions of human beings, where otherwise plague and disease would work their utmost havoc.

ITEMS OF INTEREST Bird Department

Mating Geese.—The most uncommon event so far is the mating of a female graylag goose with a male pink-footed. These birds constructed a bulky nest and four eggs were deposited early in April. This is a really remarkable occurrence, and a detailed account will appear in a future BULLETIN.

Wintering Ostriches.—The ostriches, which have now passed their second winter in the open, have come through in perfect condition. The success of this experiment in acclimatization, which seemed decidedly risky at first, is now established beyond a doubt.

A Rare Turkey.—Quite without expectation, an apparently perfect female of the beautiful occllated turkey reached us recently from Yucatan. This species is as delicate as it is lovely and has so far defied our most determined efforts to persuade it to live with us. All of our individuals have arrived during the period of cold weather, and invariably have been infected with roup or tuberculosis before arrival. The present bird.

however, appears to be in better than average health, and we hope to be able to acclimatize her.

Friendly Gulls.—The unusual abundance of herring gulls in the neighborhood of the Zoological Park this spring induced us to place a daily supply of cut fish at convenient points about our lakes. The birds were not slow in taking advantage of our hospitality, and we have been rewarded by the constant presence for several weeks of these masters of flight. No doubt we shall soon be deprived of the pleasure, for most of the birds depart in April for the northern breeding grounds. They generally return in October, and perhaps we may be so fortunate as to be able to persuade some, at least, to pass the winter with us.

Soiled Water-Fowl .- A road that sends forth clouds of dust in the wake of every passing automobile is unquestionably an abomination. It was doubtless the ambition of the worthy persons who recently sprayed the surface of Pelham Avenue with crude oil, to remedy a condition which has caused much annovance. The task was well performed-so well, in fact, that enough oil remained upon the surface of the road to entirely cover Cope Lake and Lake Agassiz, when washed into the water by a drenching rain. This oil has had a remarkable effect upon the plumage of the water-fowl quartered on the lakes. Mallards and black ducks are now indistinguishable, by color, at least; barnacle, white fronted and Canada geese are a homogeneous and non-committal black, while the once white swans are a truly pitiful sight. As soon as the oil has passed down the Bronx River an attempt will be made to restore the feathers of the swans to their former snowy state, but inky geese of various sizes will continue to puzzle inquiring visitors until after the annual moult.

Nesting Water-fowl.—Although spring has been delayed, the Bird Department hopes for an unusual number of breeding successes when the vernal season does arrive. In a few cases, nesting operations have already begun. Several pairs of Canada geese are incubating, the first egg appearing on April 5. Mallard ducks antedated the geese by at least a week, and it is quite safe to say that a fairly careful search of the various nesting localities in the Zoological Park would reveal fully 100 nests of this enterprising bird.

The Cereopsis geese, which lost their brood of goslings in 1910, as a result of a local epidemic of parasitic bronchitis, have been busily constructing a nest in the Crane Paddock, and eggs will doubtless follow in due season. Ruddy sheldrakes, wood, mandarin and probably other ducks, are diligently home hunting.

L. S. C.

ZOOLOGICAL SOCIETY BULLETIN

Genartments:

Mammal
W. T. HORNADAY.
Aquarium
C. H. TOWNSEND.
RAYMOND C. OSBURN

Reptile
RAYMOND L. DITMARS.
Bird
C. WILLIAM BEEBE.
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ELWIN R. SANBORN, Editor.

Vol., XVI, No. 51

MAY, 1912

THE TRAGEDY OF THE GREBES.

Because of the almost unprecedented duration and frequent occurrence of periods of very low temperature, the winter of 1911-12 was an unusually severe one for those species of birds which commonly pass that season with us. In the vicinity of New York, conditions were somewhat ameliorated by the absence of deep snow, but in the northern portions of the state the reverse was the case.

The Finger Lakes of central New Yorkmore especially Cayuga, Seneca and Keukahave always been a haven for great numbers of water-fowl during the winter months. flocks of ducks take advantage of the open water to feed on the succulent aquatic plants, crustaceans and insect larvae, and numerous loons and grebes pursue the fishes which form their daily fare. Only at long intervals are these lakes frozen over, and the birds become accustomed to resorting there with confidence. Induced by the unseasonable mildness of the early winter, many others lingered on their southward journey, so that the number of individuals during the past season probably was even greater than usual.

When the sudden fall in temperature came, the birds found themselves in a serious predicament. Their feeding grounds were frozen over completely or so restricted that the available food was quickly devoured. As the ice encroached farther and farther and the circle of open water drew closer, it seemed that starvation must overtake the flock. At this juncture, however, the State Conservation Commission took a hand and the ducks were supplied daily with grain. We are informed by Mr. Llewellyn Legge, Chief Game Protector, that in February about 5,000 ducks were being cared for in a

space in Seneca Lake, kept open by the movement of the water from a large spring.

For the grebes and loons, however, this treatment was of no avail. Strongly specialized for pursuing darting fishes under water, they are almost helpless when out of that element. Loons are able to stand erect only upon the entire tarsus and cannot rise on the wing unless a good expanse of open water allows a flapping start. Grebes are not at quite such a disadvantage when ashore as are loons, all of our species being able to stand firmly upon the toes and get about fairly well. It is probable, however, that they cannot rise from the land, even when space offers for a running start.

Finding themselves being closed in by the ice and the food supply no longer accessible, these birds, possessing, perhaps, more initiative than the ducks, took wing while still able to do so and started on a search for open water. As might be expected, the flight was in a southern or south-easterly direction. The loons seem to have succeeded fairly well in reaching some haven, only one instance of disaster having come to the notice of the writer. This bird, reported as a Red-throated Loon (Gavia stellata), was stranded near Utica and died shortly after a game warden had chopped it out of the ice from which it had been unable to extricate itself. This unfortunate ending may have been hastened by the well-meaning but misguided warden, who placed the bird in a warm bath and supplied it with canned salmon!

The grebes, however, were less fortunate. Weakened by lack of food, and, no doubt, bewildered by the apparent absence of their natural element, they dropped wherever fatigue overtook them. Floundering in the deep snow, the miserable birds must have perished in great numbers. Many doubtless fell prey to foxes and other predacious creatures. Between February 11 and 28, 1912, no less than thirteen Holboell Grebes (Colymbus holboelli), shipped from Syracuse, Canajoharie and Rhinebeck, arrived at the Zoological Park, all considerably the worse for their experience.

When one considers the widely separated localities and the slimness of the chance that any individual bird would drop near a road or in some other place sufficiently travelled for the waif to be discovered, it is not difficult to believe that the number of those which died unfound must have been large indeed.

This instance forms an excellent example of the effect of natural conditions on the fluctuating status of species. For a bird of more concentrated distribution than that of this grebe, a calamity of this sort might easily result in total extermination. Even now, there can be no doubt that the Holboell Grebe has experienced a severe check, from which it may be some time in recovering. In the Auk for April, 1912, John H. Sage records that "an unusual flight of Colymbus holboelli was noticed here during the month of February, 1912." At least ten helpless birds are known to have been picked up, most of them unable to rise from the ice which covered the Connecticut River. The effects of the severe winter, then, were evidently widespread, and one can readily believe that the ranks of a species even so widely distributed as Colymbus holboelli, have been very materially reduced. L. S. C.

AN AMERICAN BIRD PROTECTOR IN SAMOA

Extract from a letter written by MASON MITCHELL, American Consul at Apia

"For the past year or more I have been trying to induce the German Governor of Samoa. Dr. Schultz, to issue laws to protect the birds of these islands. With the exception of the Tooth-Billed pigeon, no protection has been given to any bird. In consequence of this, the Lupi (Lavender-Neck Fruit-Pigeon), has decreased over fifty per cent. in the last ten years. Without protection, five years hence, they will be as scarce as the Manumea (Tooth-Billed Pigeon), especially if they are not protected in the breeding season. Formerly they were the most numerous of the six varieties of pigeons found on these islands. They are extensively shot for food, and are sold by the natives at twenty-five cents each.

"No one, either white or native, knew when or where the Lupi nested; and some averred they migrated to other islands to breed. This I have found to be untrue, for they nest in these islands, high up in the forest trees, in the parasitic plant which grows in tree-forks, called by the Samoans the laumapapa, or in English the bird's nest plant (Asplenium nidus). They hatch in October. I have seen both their nests and young birds. For this interesting bird I have advised a close season from August first to December.

"The Governor informs me the common council will take the matter up, and be guided by my advice. If they fail to do so, it will be another case like that of the passenger pigeons in America.

"I have secured protection for all the perching birds, for all time, in addition to all birds outside of the two varieties of fruit pigeons, the aquatic birds, and members of the snipe family.

Ducks need no protection. Inasmuch as the natives are unable to shoot on the wing, but few ducks are killed; and the snipe are migratory and do not nest here."

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CANVAS-BACK DUCKS ON THE WING

STORM-BOUND DUCKS

Wild ducks wintering at Branchport, New York

By C. William Beebe and Verdi Burton

THE past winter has been one of unusual severity on the bird and animal life of our northern states. It is difficult enough for the wild creatures to wage their never-ending warfare against living foes and especially man, but when to these a sudden onslaught of storm or cold is added, they have small chance of survival. At such a time the birds and animals of prey are correspondingly hard pressed to find food, and the storm-bound victims can expect from their enemies only increased energy in pursuit and capture.

Under such conditions, man should not only entirely curb his hunting and sporting proclivities, but he should do dynamic work in helping the weakened creatures to tide over the period of danger.

During the past month the Zoological Society has received several canvas-back ducks that were picked up in a starving condition, and it was learned that in many parts of New York State ducks by the hundred were brought to starvation by the continual frozen condition of their feeding waters. It is most gratifying to learn that in a number of instances, large numbers of wild-fowl were saved by systematic feeding, both on the part of game wardens and private individuals. It is also a matter for sincere congratulation that, owing to the recently inaugurated law preventing the shooting of ducks in late winter and spring, untold numbers of these birds were saved from death at the hands of persons to whom sympathy for any wild creature is an unknown characteristic. Mr. Verdi Burtch has

most kindly sent me the following notes and photographs relating to the ducks which wintered near his home at Branchport. This is in west central New York, just west of Seneca Lake. I give the notes in full, as they present so vividly the struggle for life which these splendid birds wage day after day against the elements.

At the head of Lake Keuka, near Branchport, is a sandbar formed by the inlet on the north and a big gully on the west, which cuts off the harbor from the remainder of the lake. A channel one hundred and fifty feet wide has been cut through this bar to admit boats to the harbor. This channel never entirely freezes over, even in the most severe winters like the one just past, owing to an ever present current flowing from the lake into the bay and back again.

After the lake had frozen over this winter, ducks gather in the channel to the number of several hundred. About one-half were canvasbacks, while the remainder was about equally divided between American golden-eyes and American scaup, with a lone butterball and a few redheads.

I first visited the channel on February 12, at which time they were all able to fly. As I approached, the canvas-backs arose first, then the golden-eyes and then the scaups, a portion of the latter, however, flying only to the other side. All the scaups and some of the golden-eyes and canvas-backs returned and alighted in the water, while the remainder settled on the ice, well out in the middle of the lake.

A female canvas-back, after circling a few times, became exhausted and fell to the ice, but struggled along until she reached the water. Twelve black ducks were there on February 16, and a few redheads on the 17th.

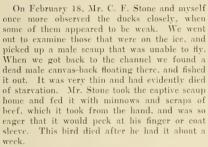


Struggling to reach the water



AMERICAN SCAUP DUCKS

Male in the lead, two females following



On the morning of February 19, Frank Verder put a lot of wheat into the water and picked up a dead male canvas-back and a dead male scaup. I threw a lot of chopped cabbage into the water, and I think that the ducks ate some of it, and cleaned up all of the wheat as well. I picked up a male canvas-back that was out on the ice unable to fly, and found a dead female golden-eye on the ice that had a hole pecked in the abdomen, doubtless the work of a herring gull.

February 22 was extremely cold, with very high winds, and altogether it was one of the roughest days which I can remember. The following day was bright with no wind. There was not one-half as many ducks in the channel as before, and very few were canvas-backs. I think that they must have arisen during the wind storm, and were blown over to Seneca Lake, where there was more open water. Two male canvas-backs that had been picked up on the ice in the inlet, unable to fly, were brought to me.

On February 24 I found only ten canvasbacks, thirty-six black ducks, about thirty American golden-eyes and American scaup, and one



AMERICAN SCAUP DUCKS
Male and Female

butterball. On February 25 the butterball, two males and a female canvas-back, nine goldencyes and a few scaups were out in the lake on the ice, and a dead black duck and a dead scaup were floating on the water.

On March 3 only a female scaup and the butterball were left. A dead canvas-back lay at the edge of the ice, and in the middle of the lake a gull was busily feeding on a dead goldeneye.

On March 10 the little butterball was the only bird left of the original flock, and it appeared to be well and strong. More ice had formed, leaving but a small space of open water, in which floated the butterball and a Holboell's grebe. When I approached, the butterball rose and was on the wing for at least ten minutes. It must have been able to catch many minnows here, because it had endured the long cold spell very well

About two hundred black ducks were in the channel every morning after March 10, working up the inlet during the day where there was considerable open water. No canvas-backs or scaups were seen after March 3, and no goldeneyes after February 24. On March 17 the ice began to break up in the inlet, and then hooded mergansers, mallard and black ducks were seen. The butterball and Holboell's grebe were still in the channel on March 15.

Rearranging the Bears.—The polar bear presented by Mr. Rainey, and temporarily occupying an outside cage of the Lion House, has been removed to Silver King's old quarters. Some of our visitors declare this bear to be a finer specimen than Silver King. She does not weigh as much, but her pelage is so very thick and white that she seems larger by comparison. The animal will undoubtedly enjoy the pool in her new quarters.



IMPERIAL PARROT

THE IMPERIAL PARROT By C. WILLIAM BEEBE Curator of Birds

N the nineteenth of February the Zoological Society came into the possession of a parrot hardly second in interest to the rare Carolina conures or parrakeets described in the last number of the BULLETIN. This is the Imperial Amazon Parrot (Amazona imperialis) of the Island of Dominica. Its demand on our interest is for the most important of all reasons-that of a vanishing race, soon to become extinct; the ever-tragic eclipse of a living creature which has slowly evolved through all the ages past. In this case the details make it all the more lamentable, for this bird is worthy of its name-in size and beauty far excelling others of its group; and for the cause of its rarity we need look no further than the wilful, needless warfare waged by ignorant human beings upon the living creatures of the earth.

Over three-quarters of a century ago one of these parrots was living in the London Zoological Gardens and it was this very bird which was first described by Mr. Vigors who named it Psittacus augustus. After passing through the fiery furnace of modern nomenclatural revision, this has finally emerged as Amazona imperialis. But though the terms are altogether changed, recognition of the beauty of the bird has always remained, whether we speak of it as the August or the Imperial.

In 1865 on the presentation of a second specimen to the London Society, we learn from the donor, Mr. Bernard, that even then it was a very rare bird in Dominica, and in its haunts in the central mountains, only one or two were obtained annually. This second bird lived for about six years. Since that time a third has been exhibited in London and another bird is in the possession of an English aviculturist. So as far as actual numbers in captivity, this bird is even rarer than the Carolina parrakeet.

The Imperial Amazon is by far the largest of its genus-a genus which is composed of at least forty-five forms, which range from Mexico throughout the West Indies and South America to Argentina. It is as large as a cockatoo, measuring twenty-one to twenty-two inches in length and with a stretch of wings of three feet. The coloring of our bird is brilliant and exceedingly harmonious in tone. 'The head, neck and under parts are purplish-brown, the feathers tipped with green on the crown and with pale lavender on the cheeks and lower plumage of the body. The nape is purplish-black, and when the bird is excited, these feathers are elevated into a conspicuous ruff. The upper plumage, sides, flanks and wings are green, with scarlet showing along the edge of the wings and on the flight feathers. The tail is chiefly of a rich warm maroon. Its eve is unusually striking, the iris being bicolored—an outer ring of bright scarlet and an inner one of pale hazel. It is impossible, however, to give a perfectly accurate description of the colors, as the tips of many of the feathers are highly iridescent. In one light the plumage of the under parts appears concolorous-of a dull coppery hue; but when the bird turns sideways to the light, there flash out on every feather, consecutive bands of the most brilliant green, purple and violet.

So our bird, which is a female, is a prize indeed, not only from the sentiment of its rarity but because of its unusual size and beauty.

Five years ago it was a young fledgling with a broken wing, in the possession of a Carib Indian. Since that time it has lived in perfect health in Roseau, Dominica, until it was found and purchased for the Zoological Society.

The island of Dominica to which the Imperial Amazon is confined is about midway in

the long chain of Lesser Antillian islets which extends in a wide curve from Porto Rico to South America. North of it is Guadaloupe, with Martinique to the south. It is roughly a flat oval in shape, twenty-five by sixteen miles and very mountainous. As I have passed it going and coming from South America I could clearly discern the high central ridge extending north and south, and sending out numerous spurs at right angles, dividing the entire island into a succession of abrupt hills and valleys.

Thirty-five years ago Mr. Ober wrote a brief account of this bird in its haunts, and since that time but little more has been added to our knowledge of the species. This splendid parrot which the natives call Ciceroo, can be found only in the highest mountains where the mountain palm, gommier or gum-tree, bois diable and other plants are found, upon the seeds of which it feeds. It is very shy and difficult of approach, and Mr. Ober tells us, "the cry is harsh, resembling the call of a wild turkey. Morning and evening they call one to another for perhaps an hour: during the rest of the day they remain silent, except for an occasional scream. When a gun is fired, they all cry out, and then keep perfect silence. They do not seem to associate in flocks at this season, like the parrot, but are found more often in pairs. They breed in the hollow tops of high trees, and the young are rarely taken. When caught young, they readily learn to talk. It descends to the valleys in the rainy season to some extent, but prefers the mountains. At this time they are very fat, excellent eating, and much hunted."

Mr. Ober made an excursion into their mountain fastnesses and camped on their feeding grounds, but so wild and wary were the birds, that though assisted by Carib Indian hunters, he was able to secure only three, which are now in the National Museum. In later years a new road was opened through the forest and one collector shot a dozen specimens.

Whatever fluctuations may mark the final years of a species, we may be almost certain that in the case of a conspicuous insular parrot such as this, there is small hope of more than a few years' lease of life.

Considered as one of the creatures which man will soon efface from the earth, the Imperial Amazon illustrates an interesting fact. Instead of being spread over a million square miles as was the Carolina parrakeet, this bird is found only on about one hundred and fifty miles of the earth's surface. But isolation in the thick tropical jungle of one small mountain ridge has done more for it than all the advantages which vast

northern forests and southern everglades conferred on the parrakeet.

As we have seen how our single northern representative of the order of Parrots has been almost if not wholly exterminated in the United States,* it is worth while briefly to review the present status of these birds in the West Indies. Three distinct groups of parrots formerly inhabited these islands, macaws, Amazons and conures or parrakeets. Of the several species of macaws, not one survives to-day, and whereas formerly, members of this splendid group of birds lived in Cuba, Jamaica, Haiti, Guadaloupe, Dominica and Martinique, all have been exterminated by the inhabitants, the persecution being the direct result of the palatibility of the birds. The last of the West Indian macaws to go was Ara tricolor, which lived in Cuba and the Isle of Pines. It was nearly two feet in length, clad in orange, maroon, scarlet and blue. The last specimen was killed forty-eight years ago, and to-day less than a dozen skins are known to exist in museums. As to the other species of macaws we have only the brief, all too imperfect, accounts of early French voyageurs and missionaries.

Thirteen species of Amazon parrots are West Indian, and fortunately only two have already become extinct, although several, like the Imperial Amazon, are almost gone. Six forms occur in the Greater Antilles in extremely diminished numbers; two in Jamaica, and one each in Cuba, the Bahamas, Haiti and Porto Rico, Grand Cayman, far to the southeast of Cuba also has a peculiar species of Amazon. These birds, with their more or less white foreheads are apparently related to the white-fronted Amazon of Mexico and Central America. Starting with the Lesser Antilles and going southward, we find two species of this group of parrots in Dominica and one in Martinique, St. Lucia and St. Vincent. Unlike the more northern forms, these natives of the smaller islands seem to have a South American ancestry, showing a closer resemblance to Brazilian species.

The violet Amazon, closely related to our Imperial bird, formerly lived in Guadaloupe, but we have now not so much as a feather left to us. From descriptions we know that its head and neck were violet or slate-colored, its back green and its wings yellow and red. More than two hundred and fifty years ago it was written of this bird that when it eats cashew nuts its flesh tastes like garlie; if it feeds on "bois des inde" it tastes like cloves; if on bitter fruits, it

^{*} The last authentic record is that of Mr. Frank M. Chapman, who, in April, 1904, saw thirteen Carolina parrakeets in the Okeechobee region of southern Florida.

becomes bitter as gall, but when the parrot feeds on guavas it is at its best and then the French commit great havoe among the flocks. In 1779 the violet Amazon had become very rare owing to the terrible war which the French colonists wage on it when it is "fat and succulent." So to-day we can only wish that the birds had adhered to a diet of eashew and bitter fruits!

In Martinique there lived a green Amazon with red cap and tail-feathers, of which an early writer says, "the parrot is too common for me to stop to give a description of it." It has since vanished, leaving not a feather. Mr. Rothschild in his volume on Extinct Birds has collected much of the available data and gives colored plates of these macaws and parrots, reconstructed from the fragmentory descriptions.

The third group is the long-tailed conures or parrakeets which are smaller than the others, and being less conspicuous and valuable as food we find very meagre notices of them among early writers on the islands. Mr. Austin Clark has summed up our knowledge of these birds, and finds that they are at present found in Jamaica. Cuba, Haiti, Porto Rico and St. Thomas, while similar or closely related species have been exterminated on Guadaloupe, Dominica, Martinique and Barbados.

We have had on exhibition in the Large Bird House, no fewer than twenty-three forms of the genus Amazona, five of them West Indian.

With our trumpeter swans, whooping cranes, Carolina parrakeets and Imperial Amazon we have the foundation of a collection of extreme interest and value, and one which should attract many visitors to the Zoological Park. As we watch these pitiful remnants of earthly races, we feel like ascribing to them the death slogan of the old Roman gladiators, "Morituri salutamus!"

ITEMS OF INTEREST Mammal Department

Moving the Polar Bear.—Silver King, the big polar bear, is now one of the most contented inmates of the Park. He has entirely abandoned his sullen attitude since his home has been changed from the small den built especially for him, to the Polar Bear Den with its large swimming pool. Having sold the female polar bear, which previously occupied the big bear den, Silver King was moved into his commodious quarters on the morning of April 15. When the big shifting box was placed against his cage he evineed a decided determination to remain where he was, and although we blocked off the sides with heavy oak planks, giving him very little

room, he refused to leave his old quarters. A large piece of beef was fastened in one end of the shifting cage, but even this failed to arouse the bear.

It was then decided to try an interesting experiment, by bringing Flip, the walrus, down in front of the den, to see if this would attract Silver King's attention. The walrus is very tame and will follow Keeper Snyder wherever he goes. Waddling after Mr. Snyder, toward the bear den, the walrus emitted a series of grunts and characteristic gutteral sounds which caused Silver King to rear on his hind feet and look with interest on the approaching procession. There was no doubt about the bear recognizing his natural prey of the ice floes. As the walrus passed, he started tearing at the bars.

When Flip was stationed in front of the shifting eage, Silver King thrust in his head and shoulders and gazed at the living bait, with marked interest. Flip was then given a soap box as a pedestal, placed directly in front of the door of the shifting eage. Almost immediately after he had climbed on this, the big polar bear hurled himself in, when the door was lowered behind him. Flip was then led back to his tank, while Silver King followed his awkward gait with longing and hungry gaze.

The shifting cage was soon lashed against the open door of the big Polar Bear Den, and Silver King lost not a minute in entering his new quarters and making a detailed investigation. Men were assigned to watch him all through the day, and a keeper remained all night to observe the bear's actions in his new cage. There was, however, no need of this vigil, as Silver King spent a great part of his time swimming in the commodious tank and appeared to be well satisfied with his new quarters. We anticipated more trouble in enticing him into the steel cage attached to the den where he might be locked in during cleaning time. Silver King made a travesty of our apprehensions by utilizing this shifting den as his sleeping quarters from the start, so the change is in every way satisfactory to this fine animal and to the keepers. In fact, in his new den this redoubtable animal has done none of the troublesome things that we had good reason to expect of him.

Hybrid Bear Cubs.—Our visitors have been much amused at the antics of the hybrid bear cubs. The tiny youngsters commenced gamboling around the den with the first warm spring days. Compared with the mother, which weighs 350 pounds, these little bears are ludicrously

small. They are exceedingly playful, and despite their size, stand upon their hind feet and box at each other in true bear fashion.

The arrival of these young bears was attended by unusual condition, as Czarina, the mother of the bears, has for years avoided the sleeping compartments. It was during very cold weather, in January, that we discovered the little bears, which Czarina had huddled in an unprotected corner of the den. Young bears are the most helpless creatures imaginable, and it seemed that we must surely lose them from exposure to the cold. As Czarina would not go into her sleeping house with her helpless cubs, it was a case of building a house over the mother and her litter.

Boards were fastened against the bars at the southwest corner of the cage and a quantity of bedding was shoved into this corner. We then proceeded to house Czarina in by building a roof over her and boarding up the front of the triangle, as there were other bears in the den that might interfere with the youngsters. We made this house strong enough to prevent them from tearing it apart and covered it with planks studded with wire nails. A tar paper, water-proof covering was afterwards added. A small door was cut, through which to feed Czarina, and she appeared well satisfied in these close quarters, where she remained thus confined until early in April, when the young bears were strong enough to withstand exposure to the weather. The front of the house was then removed and late in April the entire structure was taken down. Then it was, during a cold rain, that Czarina decided to shelter her young in the sleeping den, which she entered for the first time in four years.

Tropical Bears in Winter.—The South American spectacle bear has successfully passed the winter out of doors. Frederico was inclined to shiver and look uncomfortable at the approach of the really cold weather, so we built a glass extension in front of his cage, of hot-bed frames, and heated the interior of the enclosure with a small oil stove. Under these conditions he experienced no further discomfort. This rare animal will soon be transferred to his permanent cage, which will be the northerly one in the new series of Bear Dens. The other South American bears will be quartered near by. The sleeping dens of these animals will be warmed during the winter months by small electric R. L. D. heaters.

Bulletin No. 6:-Wanted, two copies.

BIRDS OF PREY AND THEIR AVIARY

By C. WILLIAM BEEBE and L. S. CRANDALL

PART L.

THE Eagles, the Hawks and the Vultures have at last come into their own! The splendid collection of these birds in the Zoological Park, from the great condor of the Andes with his ten foot span of wings, to the tiny Cuban sparrow hawk, are waiting only the coming of May to be installed in their spacious new quarters. No more shall the King of Birds be confined in such cages as happen to be vacant in the Ostrich or the Aquatic Bird Houses; but from now on, all the great feathered, aerial carnivores will have a permanent home of their own in the heart of Bird Valley.

Every one of these birds is of interest; both from the standpoint of the position it has won for itself in life, and from the importance of its relation to mankind. The unconquerable spirit of the peregrine falcon and the golden eagle looks out through their fierce, splendid eyes, revealing that fearlessness in attack upon domestic creatures which turns every man's hand against them; the less fierce but keen, searching watchfulness of the great Asiatic vultures reminds us of the thousands of human lives they save each year in their work as scavengers.

The aviary we shall discuss in Part II; and in future publications the interesting lives of individual species will be taken up in detail, their haunts, their homes, their ways of life and their relation to mankind.

The vultures of North and South America are included in the Order Cathartidiformes, while those of the Old World are united with the hawks and eagles of both hemispheres, as Accipitriformes. Of the latter group, the vultures form the family Iulturidae. Most of these birds feed entirely upon carrion, seldom having the temerity to attack living creatres.

The Griffon Vulture (Gyps fulvus) of Europe and northern Africa is, without doubt, the best known, and has been divided into a number of local races or subspecies, each differing slightly from the others, although the name griffon is applied indiscriminately to several of them.

This bird lives in companies in open country, generally roosting on nearby cliffs. While hunting, they soar over the surrounding country at great heights. At the first sight of food, the bird spying it swoops downward, this movement being noted by its neighbors which immediately follow. Thus there is no dearth of guests at the gruesome feast.

Our pair of Griffons, which has been with us for several years, constructs a nest each spring in the straw covering the floor of the aviary at that season. Two white eggs are deposited, although the normal clutch is given as one only. These eggs, unfortunately, have invariably proved infertile.

Greatest in size and most repulsive in appearance of the Old World vultures now represented in the collection, the Eared Vulture (Otogyps auricularis) is probably also the most uncommon. The bare skin of the head and neck varies in color from sickly flesh color to blood red, accord-

ing to the condition and age of the bird. The absence of feathers throws into greater prominence the powerful, hooked beak. The playful and almost jovial nature possessed by many vultures of both the Old World and the New, is well developed in this species. Its greatest pleasure is to strongly oppose the keeper's attempt to clean its cage; striking at the rake with awkward but powerful feet. This vulture is a native of tropical Africa, the birds of Egypt being considered as a separate form by some authorities.

Perhaps the most maligned of all the Falconidae is the Red-Tailed Hawk (Buteo borealis). This unfortunate bird is known variously as chicken-hawk and hen-hawk, in reference to its fancied habit of raiding poultry yards. For this reason, the Red-Tail is perse-



HARPY EAGLE

cuted continually and shot on every possible occasion by the farmer, in his supposedly righteous indignation. As the bird generally meets its fate while hunting for the destructive mice that swarm about the fields, its end is even more deplorable. And it is while the farmer is about, bent on the destruction of this beneficial creature, that the rapacious Cooper or sharpshinned hawk spreads swift destruction among his poultry. And it is this same speed that carries the marauder out of danger; often before his presence is known and almost invariably before his species can be determined. Shooters

should learn to distinguish bird-killing from harmless hawks, and it is our intention to arrange a series of native species to facilitate the

gaining of this knowledge.

The Harpy Eagle (Thrasaëtus harpyia) is one of the largest and most powerful of the Accipitrine birds. An inhabitant of the dense tropical forests from Mexico southward, little has been learned of its wild habits. The thickness of its tarsi and the extreme length of its talons testify to the fact that their owner feeds on animals of considerable size, and it is known that fawns, peccaries, sloths and monkeys enter into its bill of fare. The wings are broad and strong, and although the bird appears slow and awkward while moving about its cage, it is said to be able to handle itself with great ease while on the wing. Certain it is, that once its selected



RED-TAILED HAWK



GRIFFON VULTURE

victim has been seized by the great hooked claws, it has small chance for escape.

The nesting habits of this magnificent bird are very little known. It is said to build in the tops of the highest forest trees or on rocky cliffs, the nests being repaired and used year after year. It is sometimes said by the indians that the Harpy lays four or five eggs, the last three serving as food for the eaglets hatched from the two others. This, however, is a very common tale, most often related of those species concerning which the truth is not known, and is probably untrue.

Because of the inaccesibility of their habitat, Harpies are seldom to be obtained and our two fine specimens were secured only after years of waiting.

Of the larger birds of prev of the Old World. probably the best known is the Lammergever or Bearded Vulture (Gypaetus barbatus). This bird seems to occupy a position intermediate between the eagles and vultures, differing from the latter in its fully feathered head, but resembling them closely in most other points. It probably feeds mostly upon such carcasses as chance brings in its way, but there seems to be no doubt that it kills its own prev on occasion. It is said to be very destructive among the herds of sheep in spring, darting at the lambs as they stand near the brink of a precipice and either pushing them over with the force of the blow or so startling the little creatures as to cause them to lose their balance and plunge downward, when their persecutor follows leisurely to feast. It is from this habit that its German name has been derived.

The Lammergeyer once ranged from Portugal to China, but is now no longer found in Europe, unless possibly in the mountains of the southeastern portion. It is a bird of the peaks and builds its nest in the most inaccessible cavities. The single brownish egg is laid usually in February. The period of incubation and the length of time spent in the nest by the young bird, are unknown.

The Golden Eagle (Aquila chrysactos) is found throughout North America, Europe and northern Asia, varying its habits according to the conformation of the country of its range. Its food consists of live mammals and birds, in the pursuit of which it is very active, when its size is considered. Dead animals, however, are not refused and doubtless form a very considerable portion of its diet.

In North America, this bird is often confused with the immature bald eagle from which it is to be distinguished by its feathered tarsi. In



INDIAN CRESTED EAGLE



BALD EAGLE



LAMMERGEYER



EARED VULTURE



GOLDEN EAGLE

the eastern United States it is not common, but it is numerous among the mountains of the West, where its nest is built on well secluded ledges.

In Europe and northern Asia, the Golden Eagle is widely distributed. This is thought to be the bird used by the Tartars in hunting. The birds are trained as were the falcons of Europe, to pursue and capture game for the benefit of their masters. The eagle is generally carried by a horseman and is kept hooded until game is sighted, when the hood is removed and the leash slipped. The bird at once mounts into the air, and, spying the fleeing creature, dashes off in pursuit, the sportsman following the chase on foot or horseback. The animals most frequently flown at with Golden Eagles are antelopes and sometimes wolves, with which the bird is well able to cope. Pallas states that the value among the Tartars of a well trained bird of this species is equal to that of two camels.

The Indian Crested Eagle (Spizaetus nipalensis) is represented in the collection by an immature specimen, for which the adjective, crested, seems somewhat misleading, as this portion of the plumage is very slightly developed in the young. The crown and nape feathers of the adult, however, reach a length of three or four inches and add greatly to the appearance of the bird. This eagle is of somewhat smaller size than the golden, and like it, has the tarsi feathered. It is clad in black, white and sober browns. It breeds throughout the Himalavas and in China and Japan, descending to the warmer plains of India to pass the winter. A bird of the forests, it is seldom seen above the trees and very rarely soars, preferring to lie in wait in some leafy retreat for the hares, part-

ridges and junglefowl which form its prey. The nest is a bulky structure, generally placed in a tall tree, and lined with green leaves; a single egg being laid.

So much has been written concerning the Bald Eagle (Haliaetus leucoephalus leucocephalus), our national emblem, that only repetitions are possible in the scope of this article. This is a bird of the air, frequently seen at great altitudes, as it describes graceful circles in keeping watch over its especial territory. It is swift and powerful on the wing, and undoubtedly takes a certain portion of its food by this means. Its principal diet, however, is composed of fish. for which it is mainly dependent upon those cast up along the shore, although it sometimes assumes the role of fisherman. It is well known. also, that the Bald Eagle is not above robbing the osprey of its prey.

The shrill scream of the Bald Eagle is very characteristic and is a familiar note in those localities in which it is of regular occurrence. The voice of the male is said to be distinguished from that of its mate in being more clear and unbroken.

As is usual among Accipitrine birds, this eagle builds its nest in a lofty position, the top of a tall tree by choice, and two or three dull white eggs are laid. The young spend several months in the nest, during which period they are fed constantly by their parents.

The northwestern form of the Bald Eagle is a much larger bird and has been separated from the type as Haliaetus leucocephalus alascanus. This subspecies is found in Alaska, Mackenzie, Kiewaten and Ungava, south to British Columbia and the Great Lakes.

GENERAL INFORMATION

MEMBERSHIP IN THE ZOOLOGICAL SOCIETY

Membership in the Zoological Society is open to all interested in the objects of the organization, who desire to contribute toward its support and are endorsed by two members in good standing.

The cost of Annual Membership is \$10 per year, which entitles the holder to admission to the Zoological Park and the Aquarium on all pay days, when he may see the collections to the best advantage. Members are entitled to the Annual Reports, bi-monthly Bulletins, Zoologica, privileges of the Administration Building, all lectures and special exhibitions, and ten complimentary tickets to the Zoological Park and Aquarium for distribution.

Any Annual Member may become a Life Member by the payment of \$200. A subscriber of \$1,000 becomes a Patron; \$2,500, an Associate Founder; \$5,000, a Founder; \$10,000, a

Founder in Perpetuity, and \$25,000, a Benefactor.

Applications for membership may be handed to the Chief Clerk, in the Zoological Park, Dr. C. H. Townsend, N. Y. Aquarium, Battery Park, New York City, or forwarded to the General Secretary, No. 11 Wall Street, New York City.

ZOOLOGICAL PARK

The Zoological Park is open every day in the year, free, except Monday and Thursday of each week, when admission is charged. Should either of these days fall on a holiday no admission fee is charged. From May 1 to November 1, the opening and closing hours are from 9 o'clock A. M. until one-half hour before sunset. From November 1 to May 1, the opening and closing hours are from 10 o'clock A. M. until one-half hour before sunset.

NEW YORK AQUARIUM

The Aquarium is open every day in the year: April 15 to October 15, from 9 o'clock A. M. to 5 o'clock P. M.; October 16 to April 14, from 10 o'clock A. M. to 4 o'clock P. M. No admission is charged.

PUBLICATIONS

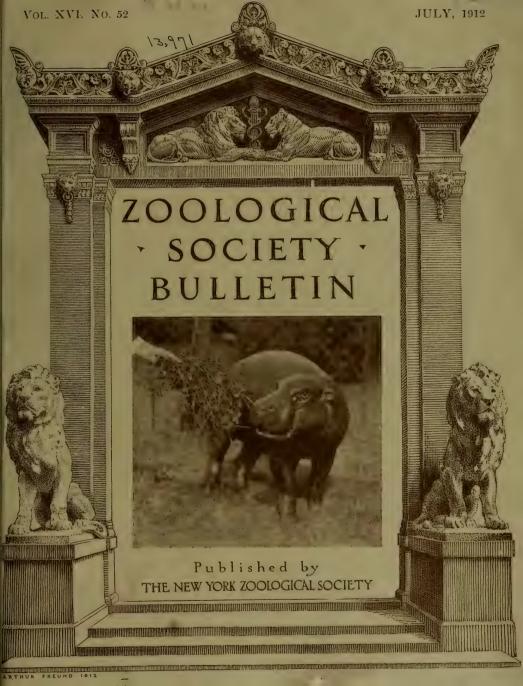
The publications of the Society are for sale at the prices affixed below. Address H. R. Mitchell, Chief Clerk, New York Zoological Park.

First	Annual	Rono	nt			.Paper	\$ 40	The Origin and Relationship of the
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Publications of the Aquarium may be obtained by writing Dr. C. H. Townsend, Director, Battery Park, New York City.





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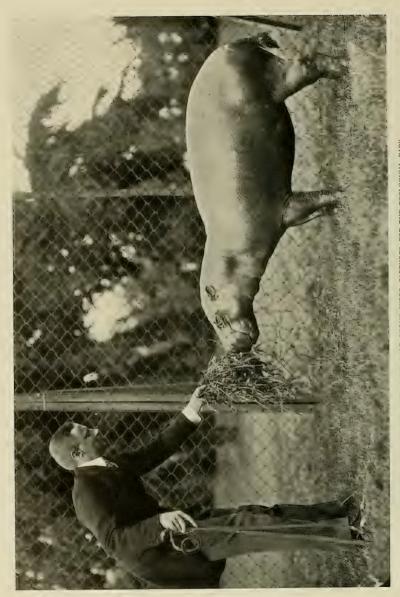
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ZOOLOGICAL SOCIETY BULLETIN

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HANS SCHOMBURGK AND THE ADULT MALE PYGMY HIPPO CAPTURED FOR THE ZOOLOGICAL PARK

ZOOLOGICAL SOCIETY BULLETIN

Published by the New York Zoological Society

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JULY 1912

Number 52

OUR PYGMY HIPPOPOTAMI*

By WILLIAM T. HORNADAY

DESPITE all the exploring to and fro in Africa, and all the slaughter of big game that for a century has furiously proceeded, the dark continent has not yet given up all her wild-animal secrets. The wonderful pygmy African elephant (Elephas pumilio) stole into the world very quietly in 1905, but in 1889 the far more wonderful okapi burst upon the scientific world like a meteor. Since that astounding animal, the zoologists have been in a mental state of what-next.

The pygmy elephant of the Congo country and elsewhere, "we-have-with-us-to-night," as it were, in the lusty personality of the type specimen, now about fourteen years of age; but thus far the okapi has eluded us. Major Powell-Cotton literally called back the supposedly almost extinct white rhinoceros by discovering in the Lado District an entirely new outcrop of them. For this species we have striven, but thus far without avail.

With the exception of a few museum men, and the few zoologists who are specially interested in the ungulates, the Pygmy Hippopatamus has been to the world nothing more than a name, and to most people it has been not even that. Its discovery was made known to the world in 1844 by Dr. Samuel G. Morton, of the Philadelphia Academy of Science, but with the publication of his papers, the diffusion

of knowledge regarding the new species almost came to an end.

Speaking generally, and so far as the standard works on natural history have been concerned, the Pygmy Hippopotamus has been almost as unknown and as mythical as the queer beasts of the visions of St. John the Divine. Touching the literature of *Hippopotamus liberiensis*, we might almost say that there is no general literature,† except a very interesting chapter in Mr. Graham Renshaw's book, "Natural History Essays."

The best way in the world to secure zoological varieties from the remote corners of the earth is by taking pains to provide funds with which to purchase the animals that bold and venturesome men are ever ready to capture and bring out for a price. It is impossible for any zoological park or garden to capture its own animal collections, without becoming a dealer in wild animals—an impossible undertaking.

Eighteen months ago, Mr. Carl Hagenbeck, ever ready to try the untried, and attempt the impossible, despatched to Liberia, west coast of Africa, an intrepid hunter and explorer named

^{*}At the hour of going to press we received from Hamburg, Major Schomburgk's account of the capture of our Pygmy Hippos. It is printed in its entirety, directly following Dr. Hormaday's article.—Ed.

[†]Proceedings of the Philadelphia Academy of Science. Morton in 1844 and 1849, and Leidy (osteology) 1852.



OUR ADULT MALE PYGMY HIPPO

Hans Schomburgk. His mission was to find and secure alive several specimens of the almost mythical Pygmy Hippo. The region which finally had to be penetrated was found to be reeking with cannibals, for whose diversion an imposing company of native soldiers had to be enlisted. Mr. Hagenbeck pithily declared that "My traveller objects to being eaten!"

The travels, experiences and hardships of Hans Schomburgk remain to be related, for the trophies have traveled faster than their history. At the present moment, the public will be most concerned in the fact that the New York Zoological Society has secured the best portion of Herr. Schomburgk's catch—a living pair of Pygmy Hippopotami!

The adult male in the case is thirty inches high at the shoulders, seventy inches in length from end of nose to base of tail, and the tail itself is twelve inches long! The weight of this animal is 419 pounds, and all these figures are offered subject to correction.

The female is believed to be only two years old. It stands eighteen inches high at the shoulders, and weighs 176 pounds.

The Pygmy Hippo is characterized first of all by its midget size, which in the adult animal is about equal to that of a twelve-months-old baby hippo of the large species. Its skull is more convex, or rounded, on its upper surface, than that of H. amphibius; its legs are longer and more slender in proportion, and its eyes do not "pop" out of its head like those of the giant species. Another striking character is the long tail, which in proportion is about twice as long as that of its only living relative, amphibius.

The face of the Pygmy is relatively smaller than that of the large species, which brings the eyes nearer to the median line of the skull. The lower jaw of the Pygmy bears only two incisor teeth, while the large species has four; and while the orbits of liberiensis are large, they are proportionally less elevated than those of the large hippo. As the latter swims nearly submerged, the eyes seem to float on the surface of the water like two shiny glass marbles.

The color of the Pygmy is recorded as "slaty black" on the back, "sides greenish slaty gray, and under parts grayish white." Pending the arrival of our specimens, we quote this remarkable color scheme with all reserve, and subject to amendment.

We await with keen interest Hans Schomburgk's account of the habits, and life history in general, of this rare and strange animal. We have been informed, however, that it makes its home in swamps and wet forests, often at a distance of several miles from the nearest river or lake, and that it is not at all dependent upon large bodies of water, as its colossal relative always seems to be. We may confidently expect to hear that it subsists on fleshy and tender plants and reeds, and grass that is not too coarse and tough to be masticated by small jaws.

Regarding the habitat of this animal, we can at present only describe it as the interior of the Republic of Liberia and regions adjacent; a designation not quite so vague as it seems, because Liberia as a whole is not large. We imagine that Herr. Schomburgk penetrated about 200 miles into the interior from the coast, but the awful character of that region would make this equal in difficulty and hardships encountered, to about 500 miles in East Africa. Heretofore it has been known that the species inhabits the Little Scarcies River, St. Paul's River, Du Queah River and Fishermen Lake.

The Pygmy Hippopotamus is, besides its only living relative, a midget, no more. Caliph, the enormous male hippo, who now stands in a mounted state in the American Museum of Natural History, stood four feet, nine and onehalf inches in shoulder height, twelve feet and four inches in length from end of nose to root of tail, his circumference was eleven feet and eight inches, and his weight has been given as close to 6,500 pounds. Beside the enormous bulk of a full grown male hippo of the common species, it is like a six-months-old human infant of thirteen pounds weight beside a man of 180 pounds. The disparity in size fairly challenges the imagination. In bulk, one adult male Nile hippo weighing 6,000 pounds is equal to fourteen adult male Pygmy Hippos! Strange to say, notwithstanding the fact that many big hippos have died in Zoological Gardens during the last hundred years, we can not learn that thus far anyone ever has had the enterprise to ascertain the weight of a full-grown male by actually weighing its remains. When our Peter the Great passes from earth, he will be weighed.

Up to this time, so Mr. Renshaw informs us, only one living specimen of the Pygmy Hippo ever has been sent from Africa to Europe. That was in 1873, when one was sent to the Dublin Zoological Gardens, arriving at that institution in a dying condition, and lived there only "about five minutes." Not a single living speci-

men ever has been exhibited, prior to the arrival of our specimens at Hamburg on June 15, 1912.

The museum of the Philadelphia Academy of Science contains the only series of museum specimens of the Pygmy Hippo now in America, embracing a mounted skin, a mounted skeleton, two skulls, and an unmounted skeleton. The Leyden Museum (Holland) is the only other which can be said to possess a series of specimens. There is one mounted skin in the London Museum and another in the Paris. This, with the mounted skin of the Dublin calf, in the Dublin Museum, completes the list of Museum specimens now extant, of an important species that was discovered and described sixty-eight years ago!

Our unique pair of living Pygmy Hippos will reach New York about July 10, 1912, and will be exhibited in the Elephant House. For their accommodation, a small additional bathingtank, communicating with their apartment, will be constructed immediately. The cost of the pair was \$12,000, and as zoological rarieties they are well worth their cost.



BULL HIPPO CAUGHT IN A PIT ON THE 29TH OF FEBRUARY



GOLAH TOWN ON LOFA RIVER Three hippos caught near

ON THE TRAIL OF THE PYGMY HIPPO

AN ACCOUNT OF THE HAGENBECK EXPEDITION TO LIBERIA

By Hans Schomburgk

Major and Military Attaché, Liberian Legation, London

OME to see me at once," was the telegram I received from Carl Hagenbeck, when I had let him know that my projected trip through the French Congo had been abandoned. I hurried to Hamburg to meet our grand old man of Stellingen, who greeted me with these words:

"Will you go for me out to West Africa, to try and capture an animal that has never been brought to Europe alive, and help me to preserve a dying species of the African fauna?"

"Why, certainly," was my reply, "Have I not just equipped an expedition to go to the Western Coast?"

But when he then told me in confidence that I was to go to Liberia, capture and bring back alive specimens of the Pygmy Hippopotamus, I must confess that I hesitated. Here I was asked to catch alive an animal which had not even yet been shot by a European hunter! Prof. Buttikofer, the great authority on Liberia, had tried for years to secure a specimen, and after all he had to be content with the skins and skeletons of three animals that had been shot by native hunters, without himself even having seen a live animal.

During my twelve years of African travel, my motto had been, "Nothing is impossible." I had explored the Wa Lunda country on the watershed of the Congo and Zambesi, without an armed escort, in the face of the evil prophecies of old hands who took leave of us for good when we started on our trip. I had succeeded in bringing home alive the first East African elephant, an undertaking that had been tried by many a well known hunter without success. "Yes," I said, "I will go!"

Six weeks after this conversation I landed in Monrovia, the capital of the Republic of Liberia. Here I was greeted from all sides with the assurance that no such animal as the Pygmy Hippo existed, but only the big Hippo.

Having read in Buttikofer's book that he had obtained a specimen of the Pygmy Hippo on the Duquea River, I decided to give this river the first trial. Unfortunately I arrived just in the beginning of the rainy season. With the greatest difficulty I managed to collect twelve carriers, who, on the promise of extra high wages, agreed to follow me.

In this lot, I must have found the human sweepings of the streets of Monrovia. How they

humbugged me! They evidently thought I was powerless to do anything, and I knew only too well that they would desert on the slightest pretext.

In Sheffeliensville I got the first news of Pygmy Hippos. Mr. Lett, an American mulatto, who had been a hunter with the Buttikofer expedition, gave me the assurance that the Pygmy Hippo existed on the upper part of the Duquea River, while his big cousin, the "Kiboko" of East Africa, only frequented the rivers near the coast. I hired six canoes in Sheffelien to bring me up to Jehtown, six days up the Duquea River.

Rain was the order of the day. In pouring rain we started every morning, and pulled all day long against the current of the swollen river. The second day out, I thought the time had come to teach my carriers a lesson. We were so far from civilization already that I no longer feared desertion.

When I called the boys in the morning to start, nobody came; so I called up my headman, and asked him very quietly if the boys were packing up.

"No," was the reply, "they do not want to start yet."

Without saying another word I took up my Browning automatic revolver, and put seven shots through the roof of the boys' hut. Then they came quickly! From that moment I took the reins; and after I had picked out the biggest and laziest of the motely crowd, and had given him a good hiding, I had no further trouble.

After a month's hard hunting, I at last had the luck to see a Pygmy Hippo. I was drifting down the river in my canoe, late one afternoon, when I saw the animal trying to climb up the steep bank of the river. Before it had noticed us, we were within ten yards. I stood with my gun ready to shoot, but with a great effort I curbed my hunting passion. Carl Hagenbeck's last word had been: "Now, remember! We must have our animals alive! Do not shoot before you are sure to be able to catch one." Not five yards from the canoe the little brute dropped back into the water and disappeared.

Shorly after that I returned to the coast and fitted out anew to penetrate into the Golah country. Two months I hunted there without any success. In the rains it was practically impossible to find any tracks; but in spite of everything I managed to find about thirty promising places in which to dig my pits. At first I had the intention to try netting the animals, but the uncertainty of their movements, and the thick undergrowth of the dense Liberian forests, made net-hunting impracticable.

One day a Hippo fell into one of the pits. It had rained for thirty-six hours, and before my scouts reached the place it escaped unharmed! For the first time in my life, I knew myself beaten. Practically all my carriers were sick; the whole country was under water, and the native trails were recognizable only because in them the water raced down like mountain torrents.

I returned to the coast and cabled to my people that the only chances for success were in the short, dry season from January to May. The net result of this expensive expedition was that I had absolute proof of the existence of the dwarf Hippo.

But what Hagenbeck undertakes, he carries through against all odds, and without consideration of financial sacrifices. He had not lost faith in me; and in December, 1911, I started out on my second expedition. This time I was known in Liberia, and had but small difficulties in raising a caravan of fifty good men.

I had seen on the last trip that nothing could be done near the coast, though the beasts exist even within a day of the coast; but there it is hunted too much by the natives, and is consequently too rare and shy.

The confluences of the upper Lofa River were this time my goal. Here, in the practically unknown Gorze territory of the powerful and warlike Golah tribe, near the big Sue Bush, where there is no human habitation for days and days, I could reckon on success.

But again I encountered an unforseen obstacle. The Pesse tribe had declared war, and was fighting the Government and its allies.

Yangaia, a big fortified Golah town, I reached without any considerable trouble, but when I called my carriers the next morning to start, they rebelled, one and all. The previous day we had had a sharp march of twenty-five miles through thick bush. Instead of taking their loads the whole crowd came down to my tent, which I had pitched outside the village, and refused to go on. They said:

"We are tired to-day; and there is war ahead. To-day we will not move, for to-morrow we hold word."

This was all I could get out of them. The whole success of the expedition was in the balance. Had I made them the slightest concession, everything would have been lost. Once more I told them to take their loads, but only a threatening murmur was the answer. Then I saw red, open rebellion! I slipped the Browning in my pocket, took my hunting crop and went among them. Clash, crack went the whip on the



HOWARD RAPIDS IN THE LOFA RIVER, IN THE COUNTRY OF THE PYGMY HIPPO

naked body. A few straight hits from the shoulder on the jaws of those who did not move, and quicker than I can tell it I drove the mutinous crowd before me like a herd of sheep! The result of the rebellion for the boys was that I stopped their rations for three days, and their allowance of gin for a month.

The same day I reached Taquema, the fortified town of the paramount chief of the Golah, Tawe Dadwe. I had reckoned greatly on the assistance of this omnipotent native king, but to my great sorrow he declared openly that he could not help me, because the war pressed him too hard. He even expected an attack from the Pesse daily. Against my usual custom, I had to

submit to the entreaties of the chief, and pitch my tent in the middle of the town.

During my stay at Taquema the scouts of the enemy approached the town, but hearing that a white man with a big caravan and guns had arrived, they thought discretion the better part of valor. Here I had an opportunity to study the most secret sacrificial rites of this unknown tribe.

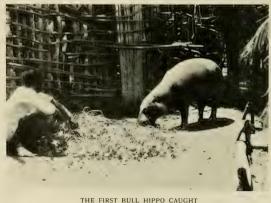
The Lofa River, one of the biggest rivers in Liberia, flows within an hour of Taquema. For two months I hunted on the small tributaries of this river, the course of which will appear entirely different from what it has been thought, when my map of the hinterland of Liberia is finished.

In spite of the greatest endeavors and the hardest work which I have done during my long hunting career in Africa, I did not even manage to shoot one of these shy and secretive animals, in order that I might send home positive proof of its existence.

The greatest difficulty in hunting the Liberian Hippopotamus is that, unlike their big cousins, they do not frequent the rivers. They make their home deep in the inhospitable forest, in the dense vegetation, on the banks of the small forest streams; but, not satisfied with the protection the forest affords them, they enlarge the hollows which the water has washed out under the banks, and in these tunnels, where they are

invisible from the bank, they sleep during the heat of the day.

Day after day I patrolled the streams, continually in water up to my hips, frequently to my shoulders. At last, as I was nearly despairing, on the 27th of February, Diana, the goddess of the hunters, smiled on me, and the first Liberian Hippopotamus fell a victim to my gun. It was a nearly full grown cow. I was following the spoor of a small herd of the newly-by-me discovered dwarf elephant, when a fresh track of a Mwe (Golah name for the Pygny Hippo), made me leave the elephants. I followed this spoor down to a small streamlet with hardly two inches of water, where it led



Photographed in Africa



BUILDING A TRANSPORT BASKET FOR CARRYING A
PYGMY HIPPO
Skeleton basket on the left

into one of the above mentioned holes. I sent my boy round, and when he started poking into the hole with a stick, a responsive grunt followed, and not two yards from me the head of the much coveted animal appeared. I still carried my elephant gun. As my shot rang through the forest, one of the rarest animals of the African fauna lay before me.

My camp was far away in the bush, and to my great regret I had to abandon the skeleton. It was only with the greatest difficulty that I managed to skin the animal and have the skin brought by my two hunters to the tent.

In spite of all difficulties, however, I had not given up the idea of catching a hippo alive.

Wherever I found a likely place I had a pit dug. It is easy to catch the great East African Hippo, which keeps continually in the same water and uses the same tracks. With the Pygmy Hippo, it is very hard to even find a place where there is the slightest chance of catching one, because this brute roams through the forest like an elephant or a pig, mostly goes singly, though sometimes in pairs, and rarely uses the same track twice.

Meanwhile over a hundred pits had been made by my men, all carefully dug seven feet deep and covered so that not the sharpest eye could detect any sign of danger.

At last, two days after I shot my first animal, and when I was still working on its thick skin, a boy rushed to my tent breathlessly shouting from afar:

"Massa! Massa! Dem Mwe done catch!"

On Nea Tindoa, an inhabited island in the Lofa river, a big bull had fallen into one of my pits. My sergeant, Momoro, started at once with a few boys to reach the place the same night, and keep guard to prevent the meat-hungry natives from killing the Hippo.

At last I had succeeded! Against the prophecies of Europeans, Liberians and natives! And only a few days before Tawe Dadwe told me: "It is impossible to catch a Mwe! It has never been done, and they have only been shot after they

have been caught in the pits. They are too dangerous. Many a hunter has been killed. You white men know a lot, but here you are trying something that is impossible."

Early the next morning I reached the place. Before night a fence had been built around the hole, and the animal was let out. It was a beautiful full-grown bull, in the prime of his life.

Nothing succeeds like success! Six days after that, the second one was caught; this time a two-year-old cow. A week later, the third, a young three-quarter-grown bull was taken. Now I had three animals, at three different places. Macca, where the little cow was caught,



CARRYING A PYGMY HIPPO Hippo transport passing through a village

I decided should be my central collecting station; and we started to bring the animals there.

Now the real trouble commenced. The Golah people refused to carry them! For the big animals, I needed at least forty men each, to cut roads and carry.

Had it not been for the unselfish assistance I had from the Liberian Government, which had appointed me Major on the Geographical Staff, I never would have been able to bring my expedition to a satisfactory end.

Nobody can imagine the enormous difficulties of the transport of those heavy animals, which we had to carry in self-invented native-made baskets, through the roadless hinterland of Liberia. From the farthest place inland, where I caught three animals, it took me, even after the men had cut the roads, twelve days to reach the first river on which I could use boat-transport to the Coast.

A native king. Gongzoo, had, on the promise of a big present, promised carriers for the first animal caught in his district, but when I asked for the men, he point blank refused! By that time I had put the Hippo in a basket, and had brought it with my own carriers, under the most frightful difficulties, to his town. It was a matter of getting men from him, or standing the chance of losing my hard-won animal.

I tried a bluff, with only my sergeant for support. I arrested the chief in the middle of his own town, kept him in front of my revolver, loaded all my guns, put them before me on the table, and declared war provided the men were not forthcoming within two hours. It succeeded. When the people saw their king a prisoner, the men came. What would have happened if they had accepted my challenge, I do not know!

After I had got the first three animals to my central station, and handed them over into the charge of one of Hagenbeck's most experienced keepers, I returned to Monrovia, to arrange all about the further transport, and to meet my wife, who had come out to join me, and to put the experience which she had gained during an eight-months horse-back ride through the hinterland of the Cameroons, into the services of Hagenbeck.

Shortly after we had returned to Macca, another big bull and a youngster were caught;

and then it was high time to return to the coast, before the rains should set in and make the country impassible. His Excellency, President D. E. Howard, very kindly put soldiers at my disposal, to assist me in collecting sufficient carriers.

After I had managed to tame a full-grown Mwe, the natives feared me so much that I succeeded in collecting 150 men in three days. While Mr. Moltmann, the keeper sent by Hagenbeck, and I hurried ahead to arrange for the food for the animals, Mrs. Schomburgk superintended the transport, as it was absolutely necessary that one European should keep an eye on the carriers so that they did not drop the heavy baskets on the uneven and partly-mountainous trails.

At last we had reached Japacca, and could put our poor, ill-treated animals into proper cages, which had been sent out from Hamburg.

Now our greatest troubles were over. The animals were in good condition and feeding well, so that we could expect to get them safe to Hamburg. But another trouble arose. When we got to the coast at Cape Mount, we were prophecied a bad sea for the first of June, the day the steamer Alexandra Woermann was to call for us. But even then our luck did not desert us. Certainly with difficulties, but without mischief, we shipped our valuable cargo. In the Bay of Biscay we had stormy weather. The ship rolled heavily, but the animals did not seem to mind it.

The enormous expenses of these two expeditions can easily be imagined when one considers that in Liberia everything has to be carried. Great quantities of trade goods are necessary to procure food for the carriers, and also as presents for the native chiefs.

Fortune has again been kind to Hagenbeck's colors. For forty years attempts had been made to bring these animals to Europe; and we had succeeded. The greatest satisfaction to me, however, was when I had the honor to be presented by Mr. Hagenbeck to His Majesty Kaiser Wilhelm II, when he visited Hagenbeck's Animal Park, at Stellingen, on the 17th of June, where he congratulated me on my success.

ZOOLOGICAL SOCIETY BULLETIN

Benariments :

Mammal W. T. HORNADAY. Aquarinm C. H. TOWNSEND. RAYMOND C. OSBURN.

Reptile RAYMOND L. DITMARS. C. WILLIAM BEEBE. LEE S. CRANDALL

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JULY, 1912

THE LAND OF THE "FREE"

The care that people bestow upon property other than their own, is the truest index of their thrift and character. Generally those who are in the most straitened circumstances have but slight conception of the value of their possessions, and are just as proportionately careless with the property of others. In some cases they are merely indifferent and thoughtless. Then there is another class that is wilfully malicious and destructive. It is a positive delight for them to steal and commit all sorts of other depredations when they are not under observation.

If the forest lands of the Park were opened wide for a single Sunday, the damage resulting could not be made good in an entire year. Every bush and shrub would be reduced to a naked skeleton, if any remained at all, and every tree might well tremble for the safety of its lower branches. It may be a noble thought to commit the peoples' parks to "the care of the people," but those who would scorn the responsibility are altogether too numerous. A great many of the visitors to the Park on Sunday, or any other day, have not the slightest desire to exercise their privilege in a decent and conscientious manner.

The disorderly ten per cent. move across the landscape like a blight, and the trail of debris in their wake is the testimony of their contempt for law and order. It is sad enough when the responsibility is carelessly or thoughtlessly laid aside, but when the human impulse is purely malicious, it would seem that the vaunted "cradle of liberty" sometimes turns out human documents that do not recognize the difference between liberty and license.

On a warm Sunday in June, two of the Park benches near the Elk House were occupied by a

large family or several persons. To mention the nationality would be to assail us with the pride of 2,000 years of bigoted ancestry; so we will call them Americans. As rapidly as they ate their luncheon, just so rapidly was the ground strewn with egg-shells, fruit-skins. papers, boxes and tins. One of the keepers passing, went to the great pains to bring a debris can to the spot and compel the visitors to clean the place thoroughly and put the rubbish into the can. Later in the day he returned to find that the little party of pleasure seekers had carefully overturned the can and scattered the contents in every direction over the ground, littering the place, not only with their own garbage, but that of perhaps a hundred others who very decently had the care of the grounds on their minds.

There are times when "liberty" is so grossly abused that it becomes a curse to decent citizens. and we often see that result in the Zoological Park. E. R. S.

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APRIL 4, 1912, TO JUNE 6, 1912

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THE EAGLE AND VULTURE AVIARY
Photographed from the roof of the Zebra House

THE BIRDS OF PREY AND THEIR AVIARY

PART II.

By C. WILLIAM BEEBE and LEE S. CRANDALL

HE Eagle and Vulture Aviary is situated just north of the new Zebra House and forms the sixth and southernmost link in the chain of bird exhibits which extends throughout the length of Bird Valley, the others being Cope Lake, the Duck Aviary, Flying Cage, Crane Paddock and Aquatic Bird House. The permanent home of the raptorial birds is a true outdoor aviary consisting of thirteen large flying cages, ranging from those twelve feet square by fifteen high, intended for the smaller hawks, to the great center flight cage, twenty-four feet square and rising to a height of thirty-two feet. Each cage has a domed concrete shelter in the rear. The twelve years of experience gained in housing these birds in the outside cages of the Aquatic House, and also in the Ostrich House, has furnished an abundance of suggestions for the details of construction.

Already it is evident that the new installation will be satisfactory in every respect. Aside from actual adaptability to the requirements of the birds of this group, an aviary such as this must be made pleasing to the eye of the visitor; and in constructing a long row of wire cages this is always a difficult matter. It was a happy

thought of Director Hornaday to bend the entire front into a sweeping segment of a circle. Thus, while from the great height of the flights the extent of the exhibit as a whole is clearly evident, no long, hard, straight lines appear, and as the visitor moves along, cage after cage is revealed around the gently curving front in a way which precludes all appearance of monotony.

Another factor, purposely introduced to break up the monotony of a straight running front, is the irregularity of the eages both in height and in size. The photograph makes this clearer than can any description—the largest cages, terminal and central, being separated by two intervening groups of smaller size.

The framework of the new aviary consists of two-inch metal pipe, with the innovation of being split, each half bolted on separately, so that the concealed attachments of the wiring can in time of need be exposed with but little trouble. The wire itself is all of electric weld, the mesh of the partitions being one by four inches to avoid any possibility of injury from birds fighting in adjoining cages. The flights intended for small hawks have wire mesh one inch by twelve, while the mesh of the seven great eagle



KING VULTURE

and condor cages measures three by twelve inches—so open that at a few yards distance the wires become almost non-existant to the eye.

As to house furnishings, the birds of prey are well provided for. There are generous tanks of clear fresh water for drinking and bathing, firm, round perches of wood for the hawks and eagles, flattened ones for the condors, at different heights, carefully arranged in relation to each other, in order to facilitate flight from the lower to the higher ones, while at the same time interfering as little as possible with the general flying area. Tall stubs of trees provide a variety of perching places, and piles of boulders will soon be furnished to those species which haunt barren rocky mountains.

The need of this aviary may be appreciated when it is stated that on the very first day of installation every cage was filled with the twenty-eight species of eagles, hawks and vultures which have heretofore had their homes in various odd cages of the bird collection.

After life in their rather cramped quarters it was good to see the birds—bald eagles, harpys, condors, and all the others, stretch their wings to the widest and flap easily up to the first perches and then to the highest, twenty-one feet above the ground. It took but a few minutes for the birds to settle down and as most of them were taken as fledglings from the nest, this new allowance of liberty will meet their utmost desires.

Beneath the domes of the concrete skeletons, low perches provide protection from rain and storm for the birds which desire it. Access to the cages is gained through sheet-iron doors at the back of each shelter. These doors are well in harmony with the general solidity of the structure and preclude all possibility of draught.

The flooring has been given careful thought. Unlike the conditions which obtain in the cages of all other groups of birds, sand is a very unsatisfactory flooring for birds of prey. It often adheres to the moist food of these birds and when swallowed becomes a menace to their health, so coarse gravel has been used instead and is proving a perfect substitute. The meat and dead animal food such as rabbits, guinea pigs and other rodents may be placed anywhere upon the floor of the cage without danger of becoming sandy and unwholesome. The gravel may be cleansed with a hose in a few minutes and the well-drained floor will leave the cage sweet and clean.

Although the very name of vulture stands for noisomeness and ill odor, these birds prefer fresh, untainted food, and in captivity will touch none but the cleanest and best they can get! As a result, our vultures are free from disagreeable odors, and their plumage is as clean as that of a thrush. In amiability and good nature they far excel their fierce and more dignified relations the hawks and eagles. The sanitary conditions are as welcome to these erstwhile scavengers as to any of the other inmates.

The New World Vultures, forming the Order Cathartidiformes, were described in Bulletins No. 31 and No. 32, and only cursory mention will be undertaken here.

The Condor (Sarcorhamphus gryphus) of the Andes, is becoming a very rare bird in captivity. It is being slaughtered for its "quills," for millinery purposes. Fortunately, it is most tenacious of life, and our old male which arrived on November 30, 1899, is still with us, after a



SOUTH AMERICAN CONDOR



DUCK HAWK

period of nearly thirteen years. He now has as cage mates, a pair of younger specimens, with which he keeps on terms of armed neutrality.

The King Vulture (Gypagus papa) is a South American bird, the scarcity of which is nearly equal to that of the condor. This is a remarkably handsome bird and the brilliant coloration of our two specimens seems strangely out of place among their sombre neighbors.

The Black and Turkey Vultures of North and South America, are divided into two subspecies each, all being represented in the collection. The North American Black Vulture (Catharista urubu urubu) is distinguished from the South American form (Catharista urubu brasiliensis) chiefly by its larger size. The South American Turkey Vulture (Cathartes aura aura) is not only much smaller than the North American bird (Cathartes aura septentrionalis) but differs also in the proportions of its head and bill, the former presenting certain peculiar bony processes not found so highly developed in septentrionalis. These vultures all are of great interest because of their high economic value as scavengers.

The Orange-Headed Vulture (Cathartes urubutinga) is undoubtedly closely related to the turkey vultures but is coal black in body color and the bare parts of the head are brilliantly colored with pale orange, pink and greenish black. These birds appear to be as particular in their feeding habits in the wild state as their

congeners are voracious, and are said by the natives to take only the choicer parts of such food as they may happen upon. It certainly is true that this species is greatly outnumbered by the turkey vultures, at least in Guiana, and is much more solitary in habit. In captivity, it is shy and delicate and will not be allowed a sufficient supply of food if confined with other larger birds.

The California Condor or Vulture (Gymnogyps californianus) is one of the finest and certainly the rarest of all the birds of prey of North America. Uncommon as this Condor is, however, two young specimens have found their way to the Zoological Park in recent years, one in 1909 and the other in the following year. We now have three individuals of this fine species, old "General" having been in the collection since 1905.

The Audubon Caracara (Polyborus cheriway) is, in a way, a link between the hawks and vultures. It hunts much upon the ground and probably feeds mostly upon carrion, but nevertheless is well able to catch and kill living prey when occasion offers, as evidenced by the sharp-ened talons.

The genus Buteo is represented in the collection by four species — the Red-Tailed Hawk (Buteo borealis borealis), the Western Red-Tail



AUDUBON CARACARA

(Buteo borealis calurus), the Red-shouldered Hawk (Buteo lineatus lineatus), and the European Buzzard (Buteo buteo). These birds are similar in habits, feeding mostly upon mice and frogs, and are of great value to the farmer.

One of the finest of the eagles is the Australian Wedge-tail (*Uroaëtus audax*), somewhat similar to the Golden in general appearance, but much more tawny in body color and lacking the feathered tarsi. Now that the importation of live birds from Australia is no longer legal, it will doubtless be difficult to secure specimens of this eagle.

The American and Ferruginous Rough-leg Hawks (Archibuteo lagopus sancti-johannis and A. ferrugineous) are now represented in the collection by several specimens each. Both possess feathered tarsi, the former presenting several plumage phases. These birds hunt mostly in the twilight, beating their way across the fields at a short distance above the ground. The owl-like appearance of the bill and gape, particularly in the Ferruginous, are very striking, and the resemblance is increased by the fact that it bolts mice and sparrows practically whole, as do the owls, and does not tear them to bits as is the habit of most hawks.

The Sea Eagles are represented by two species—the White Breasted (Haliaïetus leucogaster) and the Vulturine (Gypohierax angolensis). The former is closely related to the bald eagle and has much the same feeding habits. Both of these birds are found near the Eastern oceans, where the highly poisonous sea-snakes form a great portion of their food.

One of the fiercest and most predatory of American Accipitriformes is the Duck Hawk (Falco peregrinus anatum), so swift on the wing that it is able to overtake the fastest flying ducks. The European subspecies (Falco peregrinus peregrinus) is the Peregrine Falcon, the favorite hawk of the days of falconry, and as the two forms are separated only with great difficulty, if at all, it is safe to attribute to our bird all of the qualities of strength and courage which gave the "Noble Peregrine" its name.

ZOOLOGICAL PARK NOTES

BIRD DEPARTMENT

Gulls that Perch.—The readiness with which birds adapt themselves to the changed conditions of captivity is well demonstrated by some of the smaller gulls in the Flying Cage. While it is true that these birds may sometimes perch when flying at liberty, it is far from a common occurrence. The laughing gulls, brown-headed gulls and a short-billed gull have developed a

fondness for alighting on the slender cross-bars which join the sides of the cage close to the top. Here the birds spend most of their time, calling as vociferously as though on their native sands.

Prolific Water-fowl. - Breeding operations among the birds are now under full sway. Two pairs of herring gulls are incubating their eggs in one of the enclosures of the Goose Paddock. A number of young Canada geese are following their parents from one pond to another, while tiny mallard ducklings fairly swarm on the various bodies of water. The white call-ducks have three sturdy youngsters a month old which, as the parents are full winged, are apt to be seen almost anywhere within the Park limits. The wood ducks have been remarkably prolific. No less than eighty-eight eggs of this species, with probably a few of those of the Mandarin intermixed, have been removed from the nest boxes and entrusted to the solicitous care of sitting hens. About twenty ducklings have already been hatched, and with a fair share of good fortune, our flock of this lovely species should be greatly augmented by fall.

Nesting Owls and Vultures.—The eggs of the giant eagle owls and the griffon vultures have, as usual, come to naught. Those of the owls met with a mishap when just at the point of hatching, and were found broken at the bottom of the cage. None of the many eggs of the griffon vultures have ever proved fertile, but it is to be hoped that in the liberal confines of the new aviary better results will be obtained.

Cereopsis Geese.—The most important event of all is the successful hatching of five sturdy goslings by the cereopsis geese. The little birds are much stronger than those of two years ago and are growing rapidly. A temporary fence of fine-mesh wire has been placed across the Crane Paddock, giving the geese a large space at the southern end well supplied with grass. As this is only the second time that birds of this species have been hatched in this country, as far as known, much interest attaches to the occurrence.

The Owl Cages.—Now that the eagles and vultures have been removed to more commodious quarters, their former abodes are available for their smaller relatives and the owls. The dainty sparrow hawks, of which we possess four species, are now ensconced in two large out-door cages on the western side of the Aquatic Bird House, where they can enjoy a degree of liberty never before within our power to give them. The other cages of this series are occupied by our extensive collection of owls.

L. S. C.



FEEDING THE YOUNG HOODED SEALS From a photograph made in the Zoological Park



YOUNG HOODED SEALS IN THE ZOOLOGICAL PARK
When feeding time arrives the young seals are very alert. They watch for the keeper in a very intelligent manner.

THE HOODED SEAL OF THE NORTH ATLANTIC

By HARRY WHITNEY

XCLUSIVE of the walrus, there are five distinct species of seals inhabiting the Atlantic waters contiguous to northeastern America:-the Harbor or Ranger Seal (Callocephalus vitulinus, Linnaeus), a small coastal breeding seal which frequently ascends fresh water streams; the Ringed Seal (Phoca hispida, Schr.), also a small coastal breeding seal; the Harp Seal (Phoca gruenlandica, Fabr.), somewhat larger than the two preceding seals, and, unlike them, breeding upon the north Atlantic ice floes; the Bearded or Square-Flipper sometimes called the Big Seal (Phoca barbata, Fabricius), a very large seal, breeding along the northern coasts; and the Hooded or Bladder-Nose Seal (Cystophora cristata, Erxleben), which, like the Harp Seal, gives birth to its young upon the winter-formed ice floes of the north Atlantic.

The five young seal pups which I brought from the north in May, 1912, and which are now in the New York Zoological Park, belong to this last species, and a brief description of the species, its habits and its economic value, may be of interest to the readers of the BULLETIN.

In size, the Hooded Seal ranks second to, and sometimes rivals, the Bearded Seal, which is classed as the largest of the Atlantic seals. A full grown Hood "dog" will not infrequently measure from eight to nine feet in length, and tip the scale at one thousand pounds, while an old female Hood will often weigh between eight hundred and nine hundred pounds.

In color, the adult is bluish-black on the back, with a belly usually of lighter shade, varied with paler spots, though sometimes the belly is of a light-grayish tinge, with darker spots.

The male has a muscular sac or bag extending from the nose backward to the center of the head. This bag may be inflated at will, forming a hood-like covering to the head. It is this hood which gives the species its name.

The Hooded Seal has one other distinctive feature. While each of the other four species mentioned has six front teeth or incisors in the upper jaw and four in the lower jaw, the Hooded Seal has but four above and two below.

Both males and females will attack their enemies with boldness and savage ferocity, and in all my experience I have never encountered a more determined or dangerous antagonist among wild beasts than an angry Hooded Seal brought to bay. I have seen an old dog Hood seize a gaff between his teeth and chew it into splinters. They travel upon the ice with remarkable speed, and the hunter must always be alert, prepared to meet their vicious charge.

Hood pups are nursed by their mothers until about two weeks old, when they are left to forage for themselves. After capturing the five little pups now in the Bronx Zoological Park, and taking them aboard our ship, the Neptune, I was confronted with the difficulty of securing proper food for them, and it occurred to me to examine the stomachs of the carcasses of several of the old ones which had been killed. To my surprise I found that all I examined contained perfectly fresh herring, and in nearly every instance the fish were whole and entirely free from injury, without a tooth mark or scratch. From a single one of the old dogs I secured in this way six large fish. It is claimed that the seal herds off the Newfoundland and Labrador coasts destroy more codfish and herring each year than are taken by the entire fishing fleet.

The Hooded Seal is migratory in its habits. During the summer the greater herds are found along the southeast coast of Greenland. In February and March they appear in countless numbers on the winter-formed ice floes off the Labrador and Newfoundland coasts, both in the open Atlantic and in the Gulf of St. Lawrence.



HOODED SEALS ON THE ICE



BRINGING THE SEALS TO THE "NEPTUNE"



HOODED SEAL AND YOUNG

It is at this time that they give birth to their young upon the floes, where they are found in families consisting of the mother seal, her pup and two or three old males. I have seen few instances where a seal gave birth to more than one pup in a season.

The pup is a shapeless, furry, steel-grey ball when first born, but grows and assumes shape with truly wonderful rapidity. It is safe to estimate that it increases three or four pounds in weight in each twenty-fours hours during the first eight days after birth. The stormier the weather and the more snow that flies, the better it thrives.

The Hooded Seal attains its full growth in four years, and competent observers state that they begin breeding at that age.

It sometimes happens that large herds become imprisoned upon the floes, through long continued winds in one direction which raft the ice and cut off their retreat. When this occurs and the seals are long exposed to the strong rays of the sun, their skins burn and crack, and they are subject to intense suffering. When in this condition, at times when the ice parted, permitting them to again return to the sea, I have observed them jump clear of the water, giving bellows of pain that could be heard for a long distance. When the skins are thus burned they are valueless, and the animals are not molested by the sealers.

The value of the Hood, and, in fact, all species of north Atlantic hair seals, lies in its hide and blubber. The hide is tanned into leather, and the blubber converted into oil. From its hide, wallets, traveling bags and other fine leather goods articles are manufactured. The oil is utilized in many ways. It has even been

said that no small proportion of high grade seal oil which finds its way into the Italian market, passes through a process of deodorization and refinement and is launched upon the market by the resourceful Italian as "olive oil."

Sealing has long been one of the most important industries of the Colony of Newfoundland. The seal fishery, it is said, had its beginning early in the eighteenth century, and the records of the Newfoundland Board of Trade state that as early as the year 1742, Fogo and Twillingate reaped a profit of nearly three thousands pounds sterling from trade in seal oil.

In the early days sealers went to the ice in sailing craft, but in 1862 the Bloodhound and the Wolf, the vanguard of the present large fleet of sealing steamers especially fitted for the work, were introduced, and a new era in seal hunting began. It is the object of the sealers to find the floes upon which the herds are located, and this done, old and young alike are slaughtered upon the ice. Late in the season, after the young have taken to the water, a sealing steamer will sometimes follow a large herd at full speed for a hundred miles, or until the herd, becoming exhausted, takes to the ice floe again for rest. When thus thoroughly wearied they will not at once return to the water, and are spoken of as "beat out." After a long drive of this kind they are very poor, and large lumps form under each flipper.

The harp, the one other species, as previously stated, which whelps upon the ice, though a much smaller seal than the Hood, is more valuable, and is found in much larger herds than the Hood. The young of this species is snow white until two weeks old, when it sheds its first coat and assumes a dark slate color.

The seal hunt was at its zenith in 1831, when 686,836 seals were captured. In 1911 the total numbered 304,591. Captain Abraham Kean, with the Florizel, captured the largest number of any one ship during that year, his catch reaching a total of 49,129, of which more than half were harps.

Condition of the Great Apes.—With the exception of occasional colds and bronchial troubles, our family of great apes is in good condition. The animals have passed through the winter without serious illness, except the

chimpanzee known as Little Dick. This unusually vigorous animal has several times broken his legs during his rough play, and but recently came from the hospital where he had been retired with a dislocated knee. A new exhibition is being prepared, in which the apes will further demonstrate their mental capacity. The orang-utans, Mimi and Mike, are now nearly adult. These creatures appear to possess the strength of two men, and while both are good natured, are at times inclined to be stubborn. They are very destructive, and our repair men are kept almost constantly busy on the iron work and trapeze bars of the cage. R. L. D.



ADULT HOODED SEAL



HOODED SEAL.
The flippers are turned under when moving around



HOODED SEAL AND YOUNG
The sealer Neptune in the background



MALLARD DUCKS

ZOOLOGICAL PARK NOTES

Albino Alligators.—Through the interest and courtesy of Mr. George L. McVey, the Reptile House possesses five albino alligators. So much of the coloring pigment is lacking in the skin of these reptiles that they are of a pinkish white hue, while the eyes are very pale, though apparently as sharp and alert as those of any normal saurian. These little alligators were captured near Miami, Florida. They are now about nine inches long, lively and healthy, and indicate a disposition to rapidly develop.

Giant Spiders. — The collection of giant spiders of the tropics is of marked interest. Some of our examples have been exhibited considerably over a year, and all of them have spun intensely white silk tubes in their cages. These spiders regularly shed their skins. When the old skin is about to be east it splits up the back, the spider withdraws its legs from the original casing, leaving the former covering so intact as to appear like another spider. The keepers have several times been deceived in cleaning the cages by cautiously poking aside the shed skin of one of these creatures, while the living immate of the cage was actually hiding in its silk tunnel.

A Long-Lived Beetle.—Although the small insects are supposed to live for comparatively short periods, we have an interesting record of a beetle that was captured on the borders of the Sahara Desert by a lady visiting the Pyramids. This lady picked up the beetle and placed it in what she believed to be an air-tight tin box; her intention being to have the insect mounted upon arriving in America, as a souvenir of her trip to the desert. She believed that the insect would die immediately after being placed in the box. Arriving in America three months later she discovered the box in her trunk, and upon opening

it was astonished to find the beetle, which had been all this time without food and water, in a lively condition. She presented the insect to the Society, asking that it be installed in one of the cages of the Insect Collection. This creature died on April 10 of the present year, after having been in our possession for seventeen months. Curiously enough, it was seldom noted to partake of food during the period it was exhibited here, although it remained uniformly lively up to the time that it died.

Bushmaster and Lancehead Snakes. - From Mr. R. R. Mole, who sends us many interesting South American reptiles and insects, we have just received a fine example of the fer-de-lance and a large specimen of the South American bushmaster. These two serpents represent the deadliest species of reptiles of the new world. The lance-head snake is about six feet long and the bushmaster is about eight feet in length. The latter is of a beautiful salmon hue, the body crossed by sooty-black bands. The scales are so rough as to suggest the surface of a pineapple. In his letter relating to these serpents, both of which were captured on the Island of Trinidad, Mr. Mole explains that the great pit vipers of that island are now becoming very rare, owing to the activity among their numbers of the indian mongoose, which was imported to Trinidad some years ago. Despite its habit of killing poisonous snakes, the mongoose is not rated as a very valuable mammal in Trinidad, owing to its habit of frequently killing poultry.

New Tigers Arrive.—A fine pair of young Bengal tigers has been placed on exhibition at the Lion House. The male was born in 1910 and the female is a year older.

New Monkeys.—The happy family in the south lobby of the Monkey House has been

increased by the addition of a hamadryas baboon, two long-armed baboons, two golden baboons, six rhesus monkeys, six common macaques and two mangabeys. A new type of spring board has been constructed and placed in this cage. This spring board is about twenty feet long, very elastic and supported on studs at both ends. On it the monkeys take much vigorous exercise, some of them bounding about six feet into the air, to the great amusement of our young visitors.

R. L. D.

A Strange Nestling.—One of the white callducks established her nest in one of the mule deer shelter houses. There are four deer quartered there that make use of the house at night; but in spite of this, the duck bravely held to her post. A few days before she left the nest, Keeper Quinn observed a small, furry ball peeping out from under her wing, and upon close inspection was astonished to see-not a duckling-but a very small kitten! The duck resented any attempt on his part to approach closely, but gave no heed whatever to the little tramp. The kitten was thriving as best it could without food, but its pitiful attempts to nurse were so pathetic that we took it from the nest and carried it to the Reptile House, where it was fed and cared for. How it ever found the nest is a mystery. If it had been thrown into the range, there was yet a long distance for it to travel to reach the house, and it was so small and feeble that even this was a Herculean task.

Flip.—Our walrus, "Flip," is thriving and growing. In the last few months he has gained fifty pounds in weight and is apparently determined to join the class of animals that have lived and are going to live out the limit of their natural longevity in the Park. Keeper Snyder has devoted a great deal of care to maintaining Flip in fine condition, and the young walrus repays it, both by being healthy and having an abnormal fondness for his keeper. Some members of the Pinnipedia are well known for their remarkable intelligence, and Flip is bright beyond the ordinary range of pinniped wisdom.

If his food is not forthcoming according to the fixed schedules, he makes known his wants by tumbling his food-pan end over end along the rocks, making a continuous racket until some one comes. If irritated he barks like a sealion, but expresses pleasure with a number of softly modulated grunts. When the hood seals are fed, he is always a curious observer, and then uses his softest voice to attract the attention of the keeper. Should the man leave without noticing him, he barks lustily and dashes into the pool to show his great displeasure. He follows the keeper about like a dog, readily

climbs a flight of stairs, and descends with the greatest ease, without the slightest uncertainty.

The water in his pool is artificially maintained at the same salinity as the sea, and is evidently a potent factor in the general good health of the animal.

Young Hood Seals.— Mr. Harry Whitney, who has just returned from a trip into Arctic waters on a sealer, has presented to the Park five hood seal pups. One end of the crocodile's summer pool has been filled with salt water and the youngsters installed there. Although but a trifle over two feet long, they possess tiny, sharp teeth, and an entire willingness to use them if any familiarity is attempted. In pulling themselves up on the rocks, the front flippers are bent so that the seal really walks on the ends as they curve under. When annoyed, they express their irritation by growling very much like a dog. Only three are feeding regularly.

Moving the Bears.—The new Bear Dens are at last ready, and are being occupied as rapidly as the intended inmates can be moved. The dens fill a long-felt want. All the bears can now be brought together, and the cages that they have occupied in various other buildings can be devoted to the specimens for which they were intended. Inasmuch as many of the tropical bears require heat in the cold months, an ingenious electrical heating plant has been installed in this new series. The compartments requiring heat have been covered over, and the cage fronts fitted with glass. Each sleeping den-for the South American and Malay sun bears is provided with an electric plate warmer, fastened against the outer wall.

Gavial from the Ganges.—For the second time in the history of the Park, we have a gavial. This time the specimen is of good size. The gavial is interesting because of its habitat-the Ganges and Jumna rivers of India, and its striking form. The very long, thin snout is like the handle of a frying pan. The time was when the gavial sometimes played a part in some of the religious rites of the Hindus. It is recorded that in times past the Hindu mothers did not hesitate to throw their tiny babies into the Ganges, as an offering to the God of the river. It is a fact, however, that the inhabitants of the Ganges-Sumna region do not hold the gavial as sacred, for it is a matter of record that in 1877 Director Hornaday collected twenty-five specimens, great and small, without precipitating any trouble with the natives.

A Lizard Flying Cage.—A big yard with sand and grass, a pool of water, and the privilege of basking in the warm sun should warrant a con-



HUMAN PROFILE ICEBERG
Photographed in June, 1909, off the entrance to the harbor of St. Johns, Newfoundland, by V. S. Chapman, of Newark, New Jersey

tented and quiet collection of lizards. But it does not. Hitherto the lizards have regarded their domain as too small and persisted in leaping the fence. While the hot days of summer last, the escaped lizards do very well, but as the cool autumn nights herald the approach of winter, the escaped lizards suffer accordingly, and before they can be recaptured, sometimes become hopelessly chilled, and do not survive long. To prevent further escapes we are constructing a long run entirely covered with wire mesh. In this the lizards may climb, but any leaping will be limited, and escapes are positively barred.

A New Cheetah.—A new cheetah has been added to the collections of the Lion House, a big specimen this time, and a very friendly one. These friendly animals are valuable because they feed well and usually live longer than the nervous individuals. There is, in the new arrival, no highly-strung nervous temperament to become disarranged, with a consequent loss of appetite that must be coaxed back to normal conditions. This specimen has evidently been trained for hunting, as he may easily be led about on a leash. The collection of the Lion House has never before been so large, or so varied, and has never before contained so many handsome animals.

Playful Snow Leopards. — The two snow leopards living in the big central outside cage of the Lion House are the liveliest cats that we have ever had. They are not only constantly moving around, but seem abundantly goodnatured. In captive animals this is a valuable asset. The keepers enter the cage at cleaning time, on a perfectly amicable basis with the leopards; they perform their duties, and retire without causing the slightest disturbance. Even good-tempered animals are sometimes greatly annoyed by the presence of human beings, and often inflict injuries either upon themselves or their keepers, purely through nervousness. These

beautiful animals regard any unusual proceeding with perfect equanimity, and play, eat or sleep in the most systematic manner.

Gunda's Tusks.—Animals with tusks and horns devote a great deal of their time in wearing them down, and in a good many instances, entirely destroying them. The elephants are particularly gross offenders. An elephant is always examining locks, bolts and bars, to the detriment of his tusks.

The little pigmy elephant, Congo, splintered his tusks so badly that it was necessary to have special brass castings made to fit the ends; and sometime before, Gunda, becoming irritated at Keeper Thuman, chased him from the corral, incidentally ramming the fence and knocking six inches from the end of one of his tusks. To prevent further fractures, Gunda also will be compelled to wear brass castings.

Primate Kindergarten,-The daily exhibition of our great apes dining and performing other man-like feats, has been strengthened by the addition of some school-room work. A small blackboard has been introduced, and several of the apes are able to grasp a piece of chalk and make rough marks with it. It is exceedingly difficult for an orang or chimpanzee to use the ends of the fingers upon a small object. The chalk is held against the palm of the hand, opposite the thumb side, by the bent-in fingers. In this fashion the marking is rather awkwardly managed. Susie is by far the most expert. She goes to the board, pulls the cover down, takes the piece of chalk and marks on the board, then very soberly and even precisely places the chalk back in the groove and pushes the cover into place. Susie is a very versatile and apt pupil. When Keeper Engelholm utters a few words in a conversational tone, she readily understands.

New Sea-Lions.—The big pool on Baird Court once more resounds with the cheerful note of the sea-lion. Early this summer the bottom



INDIAN ELEPHANT GUNDA



BEAR CUB AT LIBERTY

of the pool was raised three feet, to economize water. The pool is now easier to empty and to clean, and the change in no way detracts from the swimming possibilities. The present inhabitants are exceedingly active, and furnish plenty of excitement for the visitors that constantly gather around.

Musk-Ox Herd,-Because a musk-ox looks as round and sleek as a Jersev cow, it does not necessarily follow that it is just as fat. If the musk-ox is amiable and allows one to approach closely enough to stroke him, the investigator would be astonished to find under the long, silky outside hair, a thick covering of the finest wool, at least two inches thick. During the cold that prevails in our New York winters, this covering is at its best; but as the warmer days approach, the wool is shed out, leaving the musk-ox in the lightest of summer covering. To all appearances his pelage is just as abundant as ever, and in consequence the animal is an object of much speculation by visitors as to the extent that he is able to endure the heat. Thus far this season Keeper McEnroe has collected from five young musk-oxen about twenty pounds of wool, and there are as many pounds yet on them. It could be converted into excellent clothing, as it is as fine and delicate as the best wool of sheep.

Wild-Horse Colt.—If there is special significance in being born on Sunday, our herd of Prjevalsky horses is destined to become famous, for all of the births in that family have occurred on that day. The latest foal arrived on June 9, 1912, early on Sunday morning. The total is now five specimens, three of them born in the Park.

Births.—Six elk, two axis deer, three sika, a barasingha and four red deer, besides three buffalo calves have been born into the herds

this season. Only by constantly selling the rapid increase have we been able to prevent the herds from overflowing the various ranges. Were it not that our fine surplus is in constant demand, we would be confronted by serious problems in overstocking.

Bob-White.—The quail covey that spent the winter in the Park disappeared as mysteriously as it came. Not a sign nor a sound announced the departure of the quail, and it was generally concluded that these shy birds had been frightened away for good. Unless some human voice is deceiving us, however, the very sweet calls, "Bob-white! Bob-white," that recently have floated through the woods of Beaver Valley would indicate that these interesting birds have not deserted the Park. In fact, the chances are that breeding operations are under way.

A Lively Bear Cub.—One of the little bear cubs born to Czarina possesses the faculty—which seems inherent among bears—for finding every nook or cranny worth while trying for an escape. He succeeded in getting through an opening in the overhang not over six inches wide. When captured he made a very noisy resistance and aroused his mother to the extent that the keepers could not open the gate of the den to put him back. Accordingly he was loosely wrapped in burlap and lowered into the bathing pool; his mother promptly rescuing him. All openings large enough for a small Raffles bear to squeeze through have been closed.

Shouting Pea-Fowl.—The peacock is the paradox of the avian world. To display his gorgeous plumage upon any and all occasions is apparently as agreeable to him as it is to the observer. But there is a thorn for each rose, and a voice for each peacock. While the proudly strutting bird



HIS MOTHER RESCUED HIM



OUR HERD OF PRIEVALSKY WILD HORSES AND THE LATEST ARRIVAL

is a delight to the eye, his voice is equally as great a nightmare to the musical ear.

Under ordinary working pressure, the Park does not produce sounds of sufficient intensity to provoke the discordant protest of the pea-fowl, but the heavy blasting of the rock in the workshop yards is evidently a powerful incentive. As each charge of dynamite is fired, every peacock accepts the challenge and hurls his raucous voice along the line with redoubled intensity. To those who are familiar with the aftermath, it is the rule to hear the blast, and await with bated breath the inevitable pea-fowl chorus.

Robber Sparrows.—If the English sparrow had the divine faculty of reading the human mind he might be the vainest of birds. other creature in the world attracts so much attention as this independent little tramp. Every rascally trait has been foisted upon him; and vet, in winter our streets and parks would be very cheerless without his optimistic chirping. The sparrow is a born optimist and no one can deny that he is not aggressive and self-reliant. When every food supply of our feathered migrants is closed tight in the grip of winter, this brave little fellow starves and freezes with Pickwickian cheerfulness, until the advent of another spring. He is no exception to the rule that the virtues of every creature are properly balanced by their defects. But why condemn him for so valiantly upholding with all his

sturdy courage the motto of the "early bird"? The busy bee is not in the running with the sparrow. There are no limits to the ingenuity he is called upon to employ in earning his daily bread. To him it is distinctly a case of a survival of the fittest, and his hereditary birthright of Spartan-like bringing-up has endowed him with a resolution that is not to be denied.

But for all the canny devices to which he resorts in the daily struggle for existence, the following clever trick would scarcely seem believable, had I not known the observer's veracity to be unquestioned.

The favorite hunting ground of the robin, when there are nestlings eager for food, is a smoothly-clipped lawn after a warm rain. Then the earth-worms come to the surface and are easily captured. Under these conditions a robin was observed hopping about, looking for food. A number of sparrows were also apparently similarly engaged. Finally the robin located a worm, seized it and gave a lusty pull. The worm resisted the tugging and stretched like a bow string to a length of about six inches. Suddenly a sparrow darted over, caught the worm midway between the ground and the robin's beak and flew triumphantly away with it. This operation was repeated several times by the sparrows remaining, and the robin at length gave up in despair, and departed to a locality where there was no competition and highway robbers E. R. S. were less numerous.

GENERAL INFORMATION

MEMBERSHIP IN THE ZOOLOGICAL SOCIETY

Membership in the Zoological Society is open to all interested in the objects of the organization, who desire to contribute toward its support and are endorsed by two members in good standing.

The cost of Annual Membership is \$10 per year, which entitles the holder to admission to the Zoological Park and the Aquarium on all pay days, when he may see the collections to the best advantage. Members are entitled to the Annual Reports, bi-monthly Bulletins, Zoologica, privileges of the Administration Building, all lectures and special exhibitions, and ten complimentary tickets to the Zoological Park and Aquarium for distribution.

Any Annual Member may become a Life Member by the payment of \$200. A subscriber of \$1,000 becomes a Patron; \$2,500, an Associate Founder; \$5,000, a Founder; \$10,000, a

Founder in Perpetuity, and \$25,000, a Benefactor.

Applications for membership may be handed to the Chief Clerk, in the Zoological Park, Dr. C. H. Townsend, N. Y. Aquarium, Battery Park, New York City, or forwarded to the General Secretary, No. 11 Wall Street, New York City.

ZOOLOGICAL PARK

The Zoological Park is open every day in the year, free, except Monday and Thursday of each week, when admission is charged. Should either of these days fall on a holiday no admission fee is charged. From May 1 to November 1, the opening and closing hours are from 9 o'clock A. M. until one-half hour before sunset. From November 1 to May 1, the opening and closing hours are from 10 o'clock A. M. until one-half hour before sunset.

NEW YORK AQUARIUM

The Aquarium is open every day in the year: April 15 to October 15, from 9 o'clock A. M. to 5 o'clock P. M.; October 16 to April 14, from 10 o'clock A. M. to 4 o'clock P. M. No admission is charged.

PUBLICATIONS

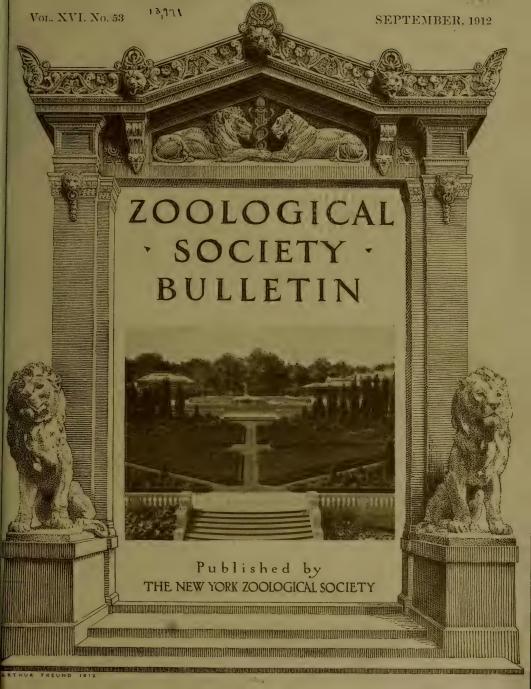
The publications of the Society are for sale at the prices affixed below. Address H. R. Mitchell, Chief Clerk, New York Zoological Park.

First Annual Report	.Paper	\$.40	The Origin and Relationship of the
		1.00	Large Mammals of North America
Third " " .40	. 66	.60	(Grant) Cloth \$.75
Fourth " " .40	46	.60	
Fifth ". " "75	- 66	1.00	Zoologica Vol. I. Nos. 1-7 inc. (Beebe), the Set 1.30
Sixth " " " .75	46.	1.00	Zoologica Vol. I. No. 8. The Northern
Seventh " " 1.00	**	1.25	Elephant Seal (Townsend)
Eighth " " 1.00	66	1.25	
Ninth " " 1.25	46	1.50	The Cultivation of Fishes in Ponds
Tenth " " 1.25	66	1.50	(Townsend)
Eleventh " " 1.00	66	1.25	Chameleons of the Sea (Instantaneous
Twelfth " " " 1.00	**	1.25	Color Changes in Fishes) (Townsend) .15
Thirteenth " " 1.00	66	1,25	
Fourteenth" " " 1.00	. 66	1.25	Sea-Shore Life (Mayer) Cloth 1.20
Fifteenth " 1.00	66	1.25	Guide Book: New York Zoological Park .25
Sixteenth " " 1.00	. "	1.25	(Hornaday)By Mail .35
Notes on Mountain Sheep of North America (Hornaday)	Paper	.40	The National Collection of Heads and Horns (Hornaday) Large quarto.
Destruction of Our Birds and Mammals			Parts 1 & 2
(Hornaday)	"	.15	
The Caribou (Grant)	66	.40	Bulletin Nos. 1 & 6Out of Print
66 66	Cloth	.60	Bulletins-bi-monthlyYearly by Mail 1.00

Souvenir Books and Post Cards of the Zoological Park may be obtained by writing the Chief Clerk, New York Zoological Park, New York City.

Publications of the Aquarium may be obtained by writing Dr. C. H. Townsend, Director, Battery Park, New York City.





Officers of the New York Zoological Society

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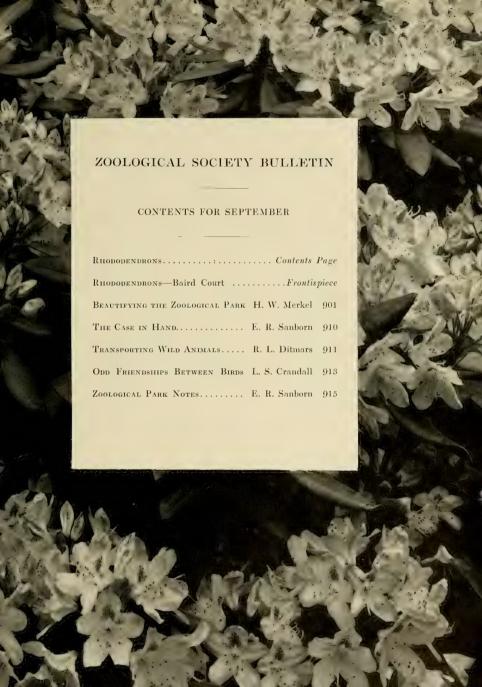
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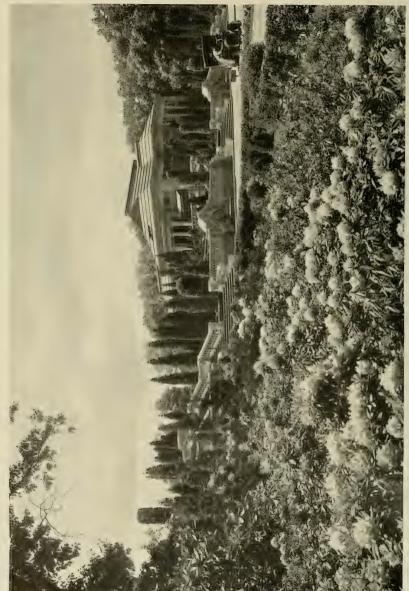
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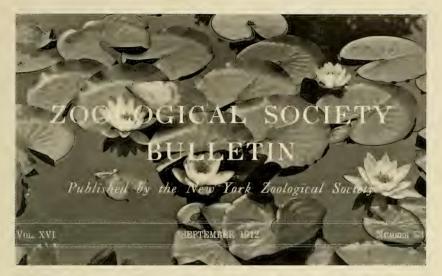
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RHODODENDRON PLANTING NEAR THE ITALIAN GARDEN



BEAUTIFYING THE ZOOLOGICAL PARK

By Hermann W. Merkel Chief Forester and Constructor

HE planting of any zoological park of magnitude presents the same problems and needs as those of other parks, with several others that are due to zoological considerations. Much additional planting is necessary, and some of the planting, which all rules of landscape architecture demand, is not possible on account of the inexorable demands of the animal kingdom, as opposed to the possibilities of the vegetable world. For example, many an ugly corner could be hidden by shrubbery if the animals would only refrain from eating such planting; and many a fine natural vista could and would be preserved were it not for the necessity of having the animals and shelter houses and shade trees necessary to a zoological park. Lakes and ponds would teem with aquatic plants if they did not teem with predatory wild ducks and geese; and the Cranes' Paddock would be a fine smooth lawn if the cranes did not consider it their life work to discover what the grass roots look like. Therefore, a compromise instead of perfection in design often is the only thing possible in a park or portion of a park where wild animals are kept for exhibition.

The writer has yet in mind the mental picture that he had made of the ultimate appearance of the interior of the Flying Cage, and the effort that was made to obtain that ideal. Lotus and papyrus were waving in the summer breeze, showing off to perfection the vivid red of the flamingo and delicate rose color of the roseate spoonbill. Bamboos and banana plants, cannas and great palms were affording nesting sites and shelters for the herons and ibises. Cormorants and pelicans were harmlessly diving and sporting among water-lilies that matched the gorgeous hues of the mandarin ducks. The great Victoria regia spread its immense leaves for the support of the dainty gallinules and egrets.

So far so good. Everything was provided and planted to produce this picture; the birds were awaited and peace reigned supreme.

The great day came. The birds were turned loose, and—but let me draw a veil over the record of the next agonizing day and night. To the credit of the winged destructors I will add that we did recover, perfectly uninjured and as good as new, several palm tubs and flower pots. So much for what might have been.

In planning the planting of the New York Zoological Park, the Executive Committee and its advisors early adopted a definite policy, and has adhered to it as strictly as possible through-



WESTERN APPROACH TO BAIRD COURT Rhododendrons and German iris

out the progress of the work. This policy was to preserve as nearly as possible the wild character of the park, to establish an adequate boundary shelter, to provide sufficient shade in all corals and along all walks, and to confine all formal planting to the immediate vicinity of the large buildings and to Baird Court. The general result appears to have given general satisfaction.

All of the planting in the Zoological Park may, like omnia Gallia of old, be divided into three parts, according to its primary use, namely; shelter or protective planting, shade planting and ornamental planting. On the south and west the Zoological Park is bounded by streets that are or ultimately will be occupied solidly by large apartment houses, which if not shut out will obtrude most unpleasantly into all the views from within, as do even now, by reason of their higher ground, certain existing buildings that in some instances are two or three blocks distant. This prospect called for the great border plantations which extend from West Farms at 182d Street, at the southeast corner of the Park, to Pelham Avenue and Southern Boulevard, the northwest corner, being in

length 1,400 feet, and in width from 30 to 250 feet.

In order to have this border effective in winter as well as in summer it was determined to use conifers to the largest extent possible; and over 5,000 of these evergreens were planted. White pine and hemlock predominate with about 750 plants of each, the remainder being white, balsam, Norway, oriental, Douglas and Colorado spruces, silver fir, Nordman's fir, red and white cedar, Austrian pine, Norway pine, pitch pine, Scotch pine and others. Wherever possible this great belt of evergreens was fronted by a planting of flowering or berry-bearing shrubs, such as arrowwood, highbush huckleberry, snowberry, witch hazel, sumacs, cornels, pepper bush, etc., of which about 12,000 were used. All of this planting has done exceedingly well, some of the white pines making an average annual growth of over 30 inches. In a way this border plantation has formed a great nursery; and many of the fine evergreens now seen at the Concourse and elsewhere have been transplanted from the borders.

Besides forming a shelter belt and wind-



WESTERN APPROACH TO BAIRD COURT Various species of iris are planted here

break, this great mass of evergreens and shrubs make an ideal home for nesting birds. Our feathered friends have not been slow to take advantage of it, and may often be seen feeding in great numbers on the berries of the various shrubs. It is a fact that it is often impossible to obtain seed from such plants as the highbush huckleberry, arrowwood and black-haw, because the birds get ahead of the men.

This year the border planting was augmented on the south by a row of Norway maples on 182d Street, which, for the most part, is elevated considerably above the Park itself, and consequently will show off the planting to great advantage.

Only those acquainted with the ground before 1904 can realize that all of our planting required an immense amount of preparation in the way of draining and filling. While it is true that some years must elapse before the evergreens will arrive at perfection, no one will dispute the fact that even now the border planting is a conspicuous and welcome feature, and of very great advantage to the Park.

For the shade plantings along the walks and

roads, and in the various corrals and ranges, deciduous trees were, of course, used in most instances. Preference has always been given to American trees of a permanent character, such as the oaks, the elms, ashes, etc. As many varieties as possible have been used, so as to present all the types that are available. It must not be understood that no quickly growing trees were planted, for we have not hesitated to use poplars, box elder and soft maples wherever shade was needed at once. In nearly every instance, however, permanent trees have been set in close proximity to the others, so that the temporary trees will not be missed when they are finally removed.

Except in two cases, that of Audubon Court and Baird Court, straight lines were carefully avoided, and all the trees were spaced so as to give ample opportunity for their full development. The importance of ample spacing is, unfortunately, often overlooked, and more private and public parks have been spoiled by planting too closely than by not planting enough.

No special attempt was made to introduce a great number of foreign species, but all of the

hardy American trees that will live have been or will be used and labelled, as we already have done with the native trees adjacent to walks and roads.

No less care was taken to give all of the trees planted an adequate amount of good soil. On Baird Court, for instance, a trench four feet deep and sixteen feet wide was filled with good soil, giving each tree nearly thirty-eight yards of soil; and in addition a cast-iron grating four feet by eight feet surrounds each trunk, preventing the packing down of the soil, and admitting air and moisture to the roots. The flourishing condition of the elms on Baird Court attests that the money and effort were not expended in vain.



In corrals and ranges it is very necessary to protect every tree with a substantial guard strong enough to withstand the attacks of whatever animal the enclosure may contain. That this is not a simple matter in the case of a bison that can strike a blow of as many foot pounds as a locomotive, or a giraffe that can reach seventeen feet or more, may readily be imagined.

The purely ornamental planting is both formal and natural in character as the occasion demanded. Of the formal planting, that of the Concourse and Italian Garden is, of course, the more important and consists, broadly speaking, of four large flower beds edged with boxwood and separated by grass walks. These are flanked by large masses of evergreens that rise from the low-creeping forms of mughus and dwarf white pine near the center, to the towering specimens of American cedar thirty feet in height. Great numbers of European and American pines, cedars, junipers and thuyas in all their horticultural forms and variations were used with charming effect. In front and below the Italian Garden the same effects were obtained in a larger way by using Japanese holly as a hedge, and large specimens of evergreens on either side of the three flights of steps that lead to the garden. Fronting the conifers and gradually blending into natural woodland are masses of hybrid and native rhododendrons in all the gorgeous colors of their kind, reinforced with various lilies. Leading from the Concourse to the entrance is a broad avenue, which, like Baird Court above the garden and Pelham Parkway below the entrance, is planted with American elms. Altogether the Concourse, Approach and the Italian Garden form a park entrance not approached in either dignity or grandeur by any other park entrance in New York.

Semi-formal in character is the perennial and shrubbery border in front of the new Eagle and Vulture Aviary. This is formed of two great masses of planting, divided by shrubs of the best kind into a number of hardy herbaceous perennial beds, presenting all that is best, newest and beautiful in hardy poppies, phloxes.

MADONNA LILY



CONIFERS ARE AS DECORATIVE IN WINTER AS IN SUMMER



POOL IN BEAVER VALLEY IN MIDSUMMER Completely surrounded by ferns and rhododendrons



GERMAN IRIS

sunflowers, asters, etc. This planting was done late in the spring of 1912 and will not show to good advantage until next year. Another interesting bit of planting is the iris and lily groups on either side of the west approach of Baird Court where American, Asiatic and European irises, which have so aptly been named the poor man's orchids, maintain a succession of blooms until July, later taken up by the lilies.

Of the informal or natural planting the best example is found in the woodland walks of Beaver Valley from the Buffalo Entrance to Baird Court. Here also we have worked with a definite aim in view, to restore an originally beautiful forest that had been trampled and picked bare of almost every native wild flower and fern into the best conditions that protection and care would have shown. Thousands of



 $\frac{\text{NORTHERN END OF BEAVER VALLEY}}{\text{Rhododendrons cover the banks and various} \quad \text{species of water lilies fill the pool}$



RHODODENDRONS

native rhododendrons, azaleas and rhodoras were planted. Leucothæ, Andromeda were brought from North Carolina, and yellow root, yew and wild flowers, such as wake-robin, bloodroot, snakeroot, violets, anemones, hepaticas and hundreds of ferns were spread under the great oaks, becches and tulip trees, until now these plants, and others like dog's-tooth violets, spring beauty, jewelweed and wood asters which came back with protection alone, make a

trip to the Park well worth the while. Farther south, along this same walk, is a magnificent mass of mountain laurel covering the whole east and north side of the hill occupied by the Rocking Stone Restaurant. Of these glorious plants, only a dozen or so broken and stunted specimens were found when the Park was taken over by the New York Zoological Society; though an abundance of stumps showed clearly that it had been a permanent feature in the forest before



MOUNTAIN LAUREL NEAR THE POLAR BEAR DEN



BORDER PLANTATION OF CONIFERS IN 1905

fire and marauders did their deadly work. Now over 4,000 fine thrifty bushes from three to six feet high delight the eyes of visitors as they approach the Lydig Arch.

On account of the poisonous nature of the foliage of the mountain laurel and rhododendrons, none have been planted near the enclosures of the runniants, as visitors might easily break off branches and feed them to the sheep, etc., with bad effect. The low wet ground opposite the Rocking Stone Hill has been planted with magnolias, the fragrant blossoms of which perfume the air for a great distance.

Another ornamental planting that may well be mentioned is the rose groups from the Buffalo Range to the restaurant. On the slope facing the upper bison corrals is an interesting lot of seedlings, showing an intermixture of Rosa rugosa, Rosa humilis and others, several of them of horticultural value. Above these and around the base of the Lydig Arch is a great mass of memorial roses, and west and north of these, two groups of Multiflora and ramblers and prairie roses. All of the varieties of roses mentioned are of value, not only on account of their flowers, but also because of the winter food supplied by the bright red rose hips, and the excellent protected nesting sites which the thorny tangle affords.

We have planted many shrubs that are useful in attracting birds, such as buckthorn, red and black chokeberry, black haw, arrowwood, mapleleaved viburnum, kinnikinnick, several cornels and many others.

Fortunately we have always had at hand an abundant supply of good fertilizer and mulching material, and the writer has never been stinted by the Director in the sinews of war necessary to care for this vast planting material, nor has he hesitated to use men or money when the occasion for extraordinary effort was required. For instance, in 1905 when our 12,000 newly planted trees and shrubs were endangered by a drought of seven weeks, permission was obtained from the Water Department to use the fire hydrants surrounding the Park, and a number of men working in relays, sometimes all night, through watering and mulching succeeded in keeping the losses down to one and one-tenth per cent., though over 5,000 of these plants were large conifers.

Again in 1912, when the shortage of water caused the Department of Water Supply to issue an order that no city water should be used on the grounds, a gasoline engine and pump, quickly purchased and set up on the banks of Lake Agassiz, saved the situation.



THE SAME PLANTATION OF CONIFERS IN 1912

To others who are considering the planting of a zoological park, our failures in this direction may be as interesting as the successes, and especially two instances which come to the writer's The first one was the combination of water birds and rhododendrons. It would seem that these two, both loving water, would agree perfectly, and for that reason the center island of the Goose Aviary was planted with rhododendrons. In spite of great care and several trials the plants have always died, undoubtedly on account of the great amount of lime voided by the fish-eating birds. The second combination that failed to work was that of squirrels and crocuses, and similar bulbous plants. On the lawn of Audubon Court we planted thousands of crocus, scillas, snowdrops, etc., but there are now but very few left. The gray squirrels, of which hundreds make their home in the Park, followed the planters closely, and worked early and late until every bulb had been dug up. The bulbs were not eaten at once, but unearthed, the sprout bitten out, and the remainder replanted for future use.

In spite of these and various other setbacks, however, the planting in the New York Zoological Park, as a whole, is more than satisfactory. It may be said that the Zoological Society has accomplished its aim, and carried out its

original plan of making the Park an attractive recreation ground, filled with the beauties of nature, where the jaded mind of the busy city dweller may find entertainment, peace or serious study, as he is inclined.

Young Pea Fowl .- Several of the pea fowl have succeeded in rearing their young this season; a matter of considerable import, as the peacocks attract the attention of the visitors as much as any of their wild contemporaries. Coming upon an old hen and her young upon one of the walks, I attempted to photograph her. This proceding she completely frustrated by circling around her young or flying directly at me whenever I approached within a radius which she evidently regarded as the danger line. She was not at all anxious to fight, but showed not the least timidity in making an attack. The young ones in the meantime were constantly running about in pursuit of insects, and seemed to have the most sublime confidence in their parent's ability to ward off any danger. So far she seems to have been eminently successful, for the young and mother were taking food from a group of visitors but a few days E. R. S. ago.

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SEPTEMBER, 1912

THE CASE IN HAND.

Some time the layman will understand that wild animals are dangerous. Some time he may learn that to safely approach an animal on terms of familiarity it is necessary to have a knowledge of the habits of the animal. More important than all else, some time he may learn that when he exercises any selfish privileges, or insists upon giving the public a treat by stepping over the rail and putting some creature through its paces, that he places the men in charge of these animals in serious danger. The visitor can make even a friendly animal dangerous, and thereby render the old adage, "familiarity breeds contempt," the very personification of truth. Any large animal approached on a basis of familiarity is thereafter in the dangerous

No living man can absolutely know the curious freaks of temperament that are constantly passing through the brain of wild animals, and after some of them have been pampered and petted by would-be animal trainers, the men who are compelled by their every-day tasks to come in contact with their various charges are liable to be sacrificed.

Any stranger who enters a corral, steps behind a railing or in any way places himself in a position that will bring him close enough to afford an animal the opportunity to do harm, is not only courting danger for himself, but is paving the way for possible future injury of the keeper. A man that takes advantage of the fact that he can secure an inside privilege, may rest assured that in "petting" large animals he is preparing trouble for the keepers; and incidentally he may inadvertently subject the officers of the Park to criticism.

It is time for visitors to call a halt, and allow the officers and keepers of the Zoological Park, who are compelled to handle vicious animals, to work out their own salvation in their own fashion.

Kindness to animals is all right up to a certain point, but carrying it beyond the danger line is nothing short of folly. For months after the male Indian elephant, Gunda, came to the Park, I visited him daily, invariably provided with sugar, some peanuts, or other bit of food that he particularly liked. He became so well acquainted with me that by whistling in a peculiar way he would come to me from any point in his yard or shelter. One day, after he had secured my offering of sugar, he launched a terrific blow at me with his trunk with deadly intent. It was a lesson that bore fruit. I never tried it again. And yet to protest with a visitor for leaning over a guard rail and presenting his hand to the teeth of a bear is to draw down upon the keeper a most indignant protest.

My work brings me constantly in contact with various animals, and, after years of observation, I have reduced it all to one line of thought: what are we going to do to each other? It is fairly possible for the man to judge, but not so with the animal. The animal is always nervous, and the tension is quite likely to carry him either in the direction of maiming himself or the man. If he is nervous to the point of fear, then the sympathy is all with the animal, and the sooner he is left to his own resources the greater the display of humanity. If he is bold and displays no timidity, the danger then points directly to the man in the case.

To the keeper of a wild animal, the location of the danger point may be diagnosed very accurately by knowledge that can be gained only by long experience. When the keeper is not absorbed with the care of a third party, his chances are at their best. If, on the other hand, there is a stranger present, the keeper is burdened with the care of the stranger and himself. The stranger does not care what happens to the animal as long as he himself is safe, and the risks are, therefore, doubled; the animal is the direct sufferer for the time being and the keeper in the end. Gunda has been for years a center of interest. Because he can throw back his head at the beck and call of every man, woman and child while they heave all kinds of food into his eager throat, and chase up and down the fence in a rage when he is tormented, he has become a great attraction.

If the responsibility for accidents could be placed where it belongs, there would be fewer accidents. Some of the people with hearts overflowing with the milk of human kindness ought to realize, if they do not, that when they pet and feed any captive animal they are liable to ruin its disposition. How many of the men who spend a part of their time in the Park on Sunday afternoons baiting the bull elk Stanley until he charges the fence to the breaking point, would dare go into the corral to feed or care for him? Not many; but someone must render this service.

Gunda is like the majority of men and women. He has moods. He has his good qualities, and his bad ones are not improved, either by ceaseless baiting or misdirected attention from people who imagine that he never gets a meal. Man cannot serve two masters, nor can an elephant. It would be an idle thought to ascribe the entire responsibility for Thuman's accident to outside influences, but it would remove all doubt if there never had been any. E. R. S.

TRANSPORTING WILD ANIMALS By RAYMOND L. DITMARS

REW of our visitors realize the time and labor consumed in moving animals from one cage to another. Such operations are frequent, and, in an institution such as the Zoological Park, where many visitors are near by, every precaution must be taken to prevent the escape of an animal. This work always demands ingenuity, and no two operations are quite alike. On an average, our work involves the removal of one animal a week, and we are rather proud of a record that shows a general absence of escapes and casualties.

It must be considered that to successfully maintain a record of this kind there must not alone be ceaseless vigilance in inspecting the many eage doors and the multitude of locks securing them, but operations relating to the removal of heavy and dangerous animals from temporary cages to permanent quarters must be most carefully planned.

Of all animals to be moved, the greatest precaution must be exercised with the bears. These animals are not only powerful, but ingenious in seeking and working at weak places. A bear will test every board of a temporary chute leading into the shifting cage. It will work at the fastenings of the shifting cage; seek to force its fore feet through any openings that may appear large enough, and rock and endeavor to upset the shifting cage. Hence it will be understood that in moving a large bear a considerable amount of planning and construction work is necessary. The shifting cage must be placed upon a strong platform constructed by efficient carpenters; in fact, the general arrangement in placing the shifting cage must be practically as strong as the permanent caging for the animal.

In moving large cats it is not necessary to adopt the elaborate precautions involved in shifting a bear. Lions, tigers and leopards are powerfully built and vigorous animals, and they become highly excited during shifting operations, but while they may tear wildly at corners or small openings, there is no ingenuity displayed in their furious attacks, nor do they seek weak points and concentrate their attention upon such places. Thus, in moving a big cat animal, a simple, hastily built staging holds the shifting cage against the door of the animal's quarters, the transportation cage is roped in position and the animal run in. This latter part of the operation may appear to those not familiar with the erratic habits of captive animals as comparatively easy.

It is during this very process, however, that many hours may be consumed in eaging a frightened or stubborn animal. The writer remembers instances where it required days to induce a bear to enter a shifting cage, and the animal went in only after all kinds of enticing bait had been placed before it. It had been prodded and coaxed and forced forward by heavy planks run through the bars, and then was observed by a man who had been left on watch to walk quietly in of its own accord.

It is often quite as difficult to induce a newly arrived animal to leave the travelling cage which it has occupied since it left its native land. Frequently it is impossible to force an animal out of its travelling cage through the door of its permanent quarters, and in such instances it is necessary to remove a panel of the door of the permanent cage in order to bring the travelling box inside. Once inside, the door of the travelling box is again opened. In a day or two the animal decides to prowl about its new quar-Then an opportunity must be awaited to trap it in the sleeping den, lock it inside, again remove the panel of the main cage and take out the travelling cage. The writer remembers a stubborn snow leopard that arrived late in the afternoon and was lashed against the open door of its new home. We worked until dark endeavoring to coax the animal out of its stuffy travelling cage, but it clung in such tenacious fashion that our labors continued well into the

Many of the smaller carnivores must be captured in nets, as they cannot be coaxed into a shifting cage. This refers to the wolves and foxes, and the greater number of the inmates of the Small-Mammal House. Some of these animals are so nervous that to capture them with a



LIFTING A CRATE FROM A SHIP'S HOLD

net is liable to cause convulsions. From such attacks they recover slowly, or perhaps not at all. For animals of such intensely nervous disposition, we prepare a trap door in the shifting cage, securely fasten food at the end of the box, and regulate the door to drop when the animal grasps the morsel inside. Many of the small carnivores, particularly the wild dogs and the foxes, prefer to starve for days before making an attempt to obtain the meat in the improvised traps.

In moving hoofed animals altogether different precautions are taken. In this work our planning is directed more toward crating the animal without injuring it. The deer and antelope are naturally timid animals and become greatly excited when they note anything unusual about to take place. The mere sight of a crate sends them scurrying to remote corners of their ranges or corrals. For the heavy stock, like the bison, we have long runways or chutes, into which the animal may be run, when section gates are successively closed behind them, finally forcing them close to the crate. With such an arrangement we crated fifteen bison in two days' time. It is, of course, impossible to construct such runways in all of the deer ranges, and we must therefore resort to various schemes in capturing and crating these nervous animals. In the past eight years we have offered for sale a considerable number of hoofed animals bred and born in the Park. This means the crating of a great number of shy and active animals, and our consultations have been many before we could decide upon the best methods of capturing them. Among several hundred deer shipped from the Park very few specimens have been sent away with as much as a bruise to illustrate our difficulties in crating them.

When we select deer to be crated, a consulta-

tion is held with the keepers in charge and a plan of campaign is mapped out. It is usually advisable to secure these animals in their shelter houses where they may be handled at close quarters; but this is not always possible, as some of our deer seldom go near their barns. In cases like this a room of the barn is selected as a trap, the animal's food is placed inside and a long rope is attached to the door. A scheme like this is not always successful. Some deer will immediately become suspicious of the unusual proceeding and prefer to fast, remaining out on the range where they are satisfied in picking up leaves or nibbling at the sparse grass. It was in this manner that we attempted to capture a herd of red deer. We were in despair of trapping them in the room until we decided to shut off their outside water supply and place a drinking trough in the room, together with their food. After five days' time, a man on guard with a rope controlling the door, noted an inclination of the animals to enter the house. They had several times approached the door, and would have entered during the night, but a sudden storm completely upset our operations. A heavy rain formed a generous pond in one corner of the range, and it was a full week's time before we finally captured these specimens.

It is considerably more difficult to pick out certain deer running with the herd. In work like this the plan is to run all the animals into a supplementary corral, and then release those not wanted. With all of the animals much excited and dashing about in every direction it is lively work to retain those specimens to be crated. So difficult is the handling of some of the hoofed animals that we often find it necessary to erect temporary spans of fence to separate them in the way described. When deer to be crated are enclosed in a room, we resort



SHIFTING A LARGE BEAR



CHUTE FOR SHIFTING BUFFALOES

to several methods in crating them. The larger deer are usually roped and pulled into a crate. With the smaller and more active specimens, several keepers rush them into corners, grasp them firmly and then force them into the boxes. While this work is not dangerous for the men, great care is necessary in handling the struggling animals to prevent breaking limbs and injuring antlers, and there is much padding of corners and of the crates themselves.

In moving reptiles, preliminary precautions are not so elaborate, although great care is necessary in handling the poisonous snakes. With very nervous examples, that will stop feeding if handled, we employ a box trap with a drop door. The snake enters the box to hide, the trap is removed to another cage, the door opened and the snake emerges at its leisure. With a big python the work is strenuous, but not particularly dangerous. The serpent is covered with a blanket, and through the folds a keeper seizes its neck. When the head is pinned down, eight or ten men quickly grasp the body; the writhing creature is straightened out, and then precipitated, tail first, into the new cage it is to occupy.

ODD FRIENDSHIPS BETWEEN BIRDS

By LEE S. CRANDALL Assistant Curator of Birds

WHILE there is undoubtedly an instinctive tendency among birds to seek mates of the same species, which accounts largely for the paucity of records of wild hybrids, there are numerous facts which tend to demonstrate that the barrier is, in many cases, a flimsy one at best and readily put aside under favorable conditions. One of the best-known

cases is that of the Lawrence and Brewster warblers, hybrids between golden-wings and blue-wings. These cross-bred birds have been noted only where the ranges of the parent species overlap, and it would appear that proximity is the only requisite for mating. Numerous wild duck hybrids have been described, many of them doubtless resulting from unions between wing-tipped birds, unable to seek more natural mates.

In captivity, the objections of birds to alien species seem to be readily overcome, and many very interesting hybrids have been produced. The greater number have been obtained from water fowl, which are easily crossed. With many species, it is necessary to confine the birds in a compartment secluded from the sight of others. Very often, however, birds at large among a diverse assembly will select mates of totally unrelated species. One of the most striking instances was furnished by a large, unpinioned male Canada goose, which had winged his way from Lake Agassiz to Cope Lake, perhaps with the intention of selecting a mate from the geese gathered there. His fancy evidently was taken by the female Cereopsis goose. Her rightful mate, however, is a powerful bird and the Canada must needs go about his courting with discretion. He commenced his campaign by attaching himself to the pair and following their every movement most assiduously. The male Cereopsis appeared to resent this attendance and did not hesitate to show his dislike. Soon, however, he became more tolerant of the other's company and ceased his hostile demonstrations. After this point, matters went smoothly for the Canada. His attentions became more and more persistent, until finally he usurped the position of the Cereopsis. Once he had gained this coveted place, however, he



RECEIVING A LION BY EXPRESS



CANADA GANDER FOLLOWING A CEREOPSIS GOOSE

did not display the magnanimity of the deposed gander, but drove him to the far end of the enclosure. As we did not consider the disturbing our pair of Cereopsis desirable, the Canada was returned, with a clipped wing, to Lake Agassiz, when the Cereopsis soon reunited.

Male Egyptian geese are well known as tyrants, and will surely prove the rogues of any collection in which they are included. splenic tempers often turn them against their weaker companions, and catastrophes are of frequent occurrence. It caused us no regret, therefore, when our old Egyptian escaped from the pen in which he and his mate are always confined during the breeding season, and met with an accident which compelled his removal from the Wild Fowl Pond and allowed us to liberate his less quarrelsome mate. It had never occurred to us that the tyranny of the male Egyptian might be domestic as well as general, but the alacrity with which the female formed an alliance with a brant goose seemed to indicate no sorrow at the loss of her former spouse.

It is true, of course, that birds mated in this manner rarely lay eggs. We were greatly disappointed, therefore, when the Bewick and Trumpeter swans, which have been close companions for years, destroyed the nest of the bean and gray-lag goose, where the latter was closely incubating her five eggs. Some most interesting hybrids might have resulted from this cross.

It is well known that wild-fowl at liberty sometimes mate for life, and rarely separate until death claims one of the couple. That crossmating and captivity do not affect the trait is well shown by an European brant and a lesser snow goose, which have been inseparable for about four years. There are several unattached

birds of these species and of each sex in the same enclosure, but the stability of the union has never been threatened.

Many of these queer friendships are purely platonic and often are formed between birds of widely separated groups. When it was decided to attempt to acclimatize the rheas during the past winter, a male guinea-fowl which had shared their corral during the summer months. was allowed to remain with them. A perch was placed across one corner of the indoor shelter for his convenience, and on it he passed the nights of fall and early winter. As the temperature dropped lower, however, the bird was no longer to be seen in his accustomed place, and his absence caused an investigation to be made. A thorough search failed to reveal his presence, and it was not until a sleepy rhea was disturbed that the missing bird was found, warmly ensconced beneath her protecting wing! The guinea-fowl availed himself of the rhea's hospitality until the warm days of spring rendered this shelter unnecessary. He then turned upon his benefactor with a ferocity which she lacked the courage to oppose and pursued her relentlessly about the enclosure. It was a truly ludicrous sight to see the diminutive bird driving his lumbering victim about the paddock, but the matter became so serious as to cause the tyrant's removal.

One of the most remarkable of these associations is that of the Ceram cassowary and the great marabou stork. Each spring, with the return of warm weather, the cassowary is given his liberty in the Crane Paddock. This is also the summer home of the Javan and Indian adjutants and the marabou. The latter tolerates the company of his allies during the few weeks that elapse between the date at which they are placed



TAHR ON THE TREE GUARD

in the paddock and the coming of good weather of sufficient constancy to insure the safety of the Cassowary. When the great bird finally is added to the group, the pleasure of his grotesque companion is unmistakable. Each is allowed the most unexpected freedom with the other's person, and frequently the cassowary may be seen lying upon the ground, the marabou perched solemnly upon his back, often with his long wings widespread. Until fall, the two birds are constantly in each other's company, and are separated only when it becomes necessary to remove them to warmer winter quarters.

ZOOLOGICAL PARK NOTES.

The Agile Goat.—It would be exceedingly difficult and very likely a useless task to attempt to prove with words alone the extraordinary mountaineering feats of the wild sheep and goats. In the language of a hunter, inelegant but expressive, "they can perch where a telescope can't look." Visitors to the Park frequently see the Rocky Mountain goats airily standing on the ridge of their shelter, or running lightly along the roofs. No matter what

the condition of the roof may be, it is negotiated with perfect ease

This feat, however, becomes rather commonplace in comparison to one performed by the Himalavan tahr on Mountain Sheep Hill. In their corral, directly on the ridge, stands a cedar tree ten inches in diameter. To protect it from the horns of the tahr family, a tree-guard of small slats was placed around it and securely fastened with wires. These sticks are five feet long, two inches wide, an inch thick and stand close to the tree, offering the most precarious foothold. Passing Mountain Sheep Hill recently. I was astonished to observe one of the goats lightly perched on the top of the guard. nimbly shifting her feet from stick to stick. There is but one way for the goat to get to the top of the guard, a straight leap from the ground, and absolute precision in alighting on the ends of the sticks. Mr. Merkel assures me that he has seen the goat with all four feet on the end of one stick. The accompanying picture does not show the goat's method of getting on the guard, but it undeniably proves that it can be done. My personal knowledge of the temper of this particular animal may fairly be regarded as proof that it would be a physical impossibility for any one to have posed her in the airy position that the photograph records.

A Reliable Engineer.—Take a small stream, a generous supply of trees (poplars and birches are best), plenty of peace and quiet, put a fence around it and add a good sized healthy American beaver. After you have done all this, come back to your peace at dusk, being perfectly certain that you furnish the quiet, and prepare to see a wonderful display of animal ingenuity.

Such an opportunity was afforded me once at our Beaver Pond and after several trips—during which time I failed to bring along enough quiet—the beaver furnished me an exclusive entertainment. The Beaver Pond is a stationary body of water and to maintain it in clean condition, a hydraulic ram keeps the water at a suitable height. In order that the water does not overflow the banks, a twelve-inch pipe has been placed under the dam in the bed of the stream. At the end of the pipe, under the dam, an elbow and a thirty-inch perpendicular joint have been attached to serve as an overflow for the pond after the water has attained a certain level.

But the beaver, not agreeing with these utilities, waged a continuous warfare with the men as to the ultimate maintenance of the water supply; and upon my successful visit I learned just

how he did it. It was nearly dusk when his nose popped out of the water near the dam. Drawing himself clumsily upon the bank, he carefully inspected the matted sticks and mud that filled the outlet of the stream from bank to bank. Apparently satisfied that there was no leakage there, he turned to the overflow pipe and peered down into the black hole.

The sound of falling water was proof that this spot needed work. Scarcely hesitating, he dived from the bank and presently reappeared with the butt of a small tree about three inches in diameter and four feet long. Dragging it to the hole he lowered it until it stood upright. With unflagging energy he made trip after trip to the bottom of the pool, each time carrying limbs of various sizes to the pipe and jamming them into it. When the stick seemed too long, he withdrew it and made a notch near the center, and, upon returning to the hole, the stick would then bend to follow the curve of the pipe. Finally he commenced to fill the interstices with mud.

In carrying the mud he was quite as ingenious as he had been in rafting his timber. Sinking to the bottom of the pool, he pushed himself along the bottom with his hind feet, plowing the mud ahead with his breast until the bank was reached. Here he seized the pile with his fore feet and, clasping it against his breast, waddled slowly to the hole and dropped it in. The number of steps back and forth to the water were innumerable, but they did not falter until the sound of the falling water was lessened and finally ceased altogether. Knowing then that his work was at end, he sat on the edge of the pool to rest and comb the mud out of his plentifully bedaubed fur.

New Zebra House.—This installation for the wild equines, with its outlying yards, will be completed and opened early this fall. The various species of wild horses, asses and zebras, of which the Society has an extensive collection, may then be exhibited to a good advantage. The collection and new installation will be thoroughly described in the next number of the BULLETIN.

Friendly Red Squirrels.—There is not one wild creature in the woods that is as shy as the red squirrel; particularly when he dwells within striking distance of boys with guns. After many of these experiences he may be heard scolding and chattering deep in the woods, but affords only fleeting glimpses of his lithe red body as

he skips about through the trees. As soon as he learns of a section of the woods where he is not molested his timidity disappears and he becomes the boldest of beggars.

At Rock City, in the Bradford oil regions, there are a few acres in which the red squirrel finds a safe refuge. Despite the fact that the grounds are swarming with people, little redskin is quite at home, and boldly runs around among the luncheon parties, begging for bits of bread or any delicacy they may offer.

Woolly Monkeys.—One of the two little woolly monkeys from the upper Amazon has now lived in the Park for nearly three years. This is a record for keeping this delicate little animal in the Park, at least, if not in any other zoological garden. The two live out of doors during all the days when the weather is agreeable; evidently a good policy for their health has remained uninterruptedly excellent.

Guinea-Fowl.-The guinea-fowl run about the Park with a very business-like air, and always impress one, as they scurry across the paths and through the bushes, as having an important mission which they are hurrying to fulfil. They invariably steal a nesting site which they conceal with great care. Whenever the hens lay they announce it by bursting out of the bushes with a tremendous noise, which is immediately echoed by the whole flock. Even though this important event is so loudly advertised, the nests are difficult to find and the appearance of a flock of young guinea-fowl is always in the nature of a surprise. When the young are hatched they have a devoted following of old birds that vie with each other in searching out delicate insect morsels for the hungry flock. Guinea-fowl are desirable birds around plant and vegetable gardens, as they wage a persistent warfare on all insect pests and seldom scratch up the ground. To some nervous persons the voice of the guinea-fowl is distracting; but to those of us who have grown accustomed to the cry of the pea fowl, the song of a guinea-hen is not without its charms.

How the Gnu Drinks.—The old adage, "there is nothing new under the sun," has been disproved by the gnu. It is quite well known that all runninants plunge there noses into water when drinking, and draw the water into their stomachs by a muscular contraction of the throat aided by the slight vacuum created. But

the gnu does not do it that way. They lap the water like a dog or a cat. This may be accounted for by the fact that the nostrils, which are thin, flat and wide, are placed near the end of the muzzle. Should the gnu thrust his nose into the water the very narrow air space would be completely covered and afford no means of breathing while drinking.

Ivy from Fontainebleau.—Mrs. Eli Harvey has presented to the Park a root of ivy from the famous forest of Fontainebleau. This noted forest has been the Mecca of all the artists of France from time immemorial. Rousseau has glorified the old oaks, and could the silent aisles of the forest speak what a wondrous story they might tell of the generations of painters that have transferred its marvelous beauty to their canvas. Mrs. Harvey has planted the tiny sprig against the sheltered side of an ancient oak near the Bear Dens.

Collecting Reptiles.—Curator Ditmars has just returned from a successful collecting trip in Sullivan County. He secured 11 species and 115 specimens of our native reptiles. In addition to these, he also captured 129 specimens of insects, including a splendid lot of katydids. Enumerating the species, there were represented in the collection 6 rattle-snakes, 14 milk snakes, 75 striped snakes, 3 red-bellied snakes, 5 ring-necked snakes, 13 water snakes, one black snake, one hog-nosed snake, 2 ribbon snakes, 17 katydids, 14 broadwinged meadow locusts, 50 walking sticks representing 2 species, eighteen narrow-winged meadow locusts, 12 lesser katydids, 8 ground katydids, and 10 cone-headed locusts.

New Shops.—Destruction of the old worn out workshops and sheds in the Service Yard is progressing steadily, and the buildings that for so long have answered a useful purpose will soon be a matter of ancient history. The Pelican House for birds is rapidly nearing completion, and work upon other structures will soon be in progress.

An Agressive Giraffe.—The giraffe is one of the mildest, most inoffensive animals, and the large placid eyes, so like the "gazelle-like eye" of which the Arabian poets write, are almost conclusive proof of its excessive timidity. But the giraffe does not lack courage nor aggressiveness in defending himself. Not having horns of a dangerous character, he makes use of the best weapons available—the two fore feet. Backed by considerable weight, he is able to strike out forward with terrific force and great precision. The movements of the giraffe are awkward, but carry him over the ground so rapidly that he is close enough to strike before one is aware of it. A blow from either foot would be a very serious matter, and the keepers have had several narrow escapes from our large male specimen.

The Chipmunk.-One of the most cheerful and active dwellers in the woods of the Park is the common chipmunk. Like the red squirrel he selects a suitable place for a home and apparently after he has determined upon the location resides there indefinitely. For many years one of these hard-working little rodents has dwelt under a boulder near the Beaver Pond. Almost any bright summer morning he may be seen perched on the top of his home-site basking in the warm sun. His labor in securing food for the long winter is limitless, and in pursuit of his task he radiates in all directions from the home base. When the wild cherry is fruitful, he scurries about under the trees stuffing his cheek pouches almost to the bursting point; making countiess trips from the harvest to the storehouse. How much food is required to carry him through the season when supplies cannot be obtained, is beyond comprehension, but the energy with which he pursues his task would indicate that the amount stored must be enormous. Considering the chipmunk's energy and the fact that he is only a trifle smaller than the red squirrel, some idea of the storing capacity of the chipmunk may be gained by the fact that in a tree which was cut down in the Park was found a squirrel's nest that contained at least two pecks of hickory nuts. This comparison is based upon the respective working ability of the two rodents.

Friendly Tortoises.—It is a matter of wonder to observe the attitude of the giant tortoises toward visitors. Like many of the other animals they have learned to beg for food, and the most astonishing part is the kinds of food they will take. It is not strange that the monkeys, deer, elephants, and even ducks, geese and peacocks accept peanuts or candy, but it is decidedly humorous when a great lumbering tortoise painfully struggles to the top of the wire fence with his fore flippers and willingly eats ham sandwiches or pie, and moreover devours the food with decided relish. E. R. S.



MOUNTAIN LAUREL, ROCKING STONE HILL

GENERAL INFORMATION

MEMBERSHIP IN THE ZOOLOGICAL SOCIETY

Membership in the Zoological Society is open to all interested in the objects of the organization, who desire to contribute toward its support.

The cost of Annual Membership is \$10 per year, which entitles the holder to admission to the Zoological Park on all pay days, when he may see the collections to the best advantage. Members are entitled to the Annual Reports, bi-monthly Bulletins, Zoologica, privileges of the Administration Building, all lectures and special exhibitions, and ten complimentary tickets to the Zoological Park for distribution.

Any Annual Member may become a Life Member by the payment of \$200. A subscriber of \$1,000 becomes a Patron; \$2,500, an Associate Founder; \$5,000, a Founder; \$10,000, a Founder in Perpetuity, and \$25,000, a Benefactor.

Applications for membership may be handed to the Chief Clerk, in the Zoological Park, Dr. C. H. Townsend, N. Y. Aquarium, Battery Park, New York City, or forwarded to the General Secretary, No. 11 Wall Street, New York City.

ZOOLOGICAL PARK

The Zoological Park is open every day in the year, free, except Monday and Thursday of each week, when admission is charged. Should either of these days fall on a holiday no admission fee is charged. From May 1 to November 1, the opening and closing hours are from 9 o'clock A. M. until one-half hour before sunset. From November 1 to May 1, the opening and closing hours are from 10 o'clock A. M. until one-half hour before sunset.

NEW YORK AQUARIUM

The Aquarium is open every day in the year: April 15 to October 15, from 9 o'clock A. M. to 5 o'clock P. M.; October 16 to April 14, from 10 o'clock A. M. to 4 o'clock P. M. No admission is charged.

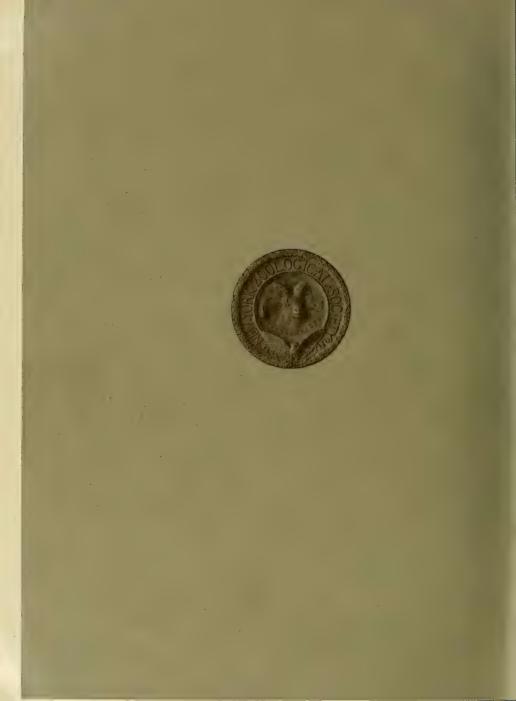
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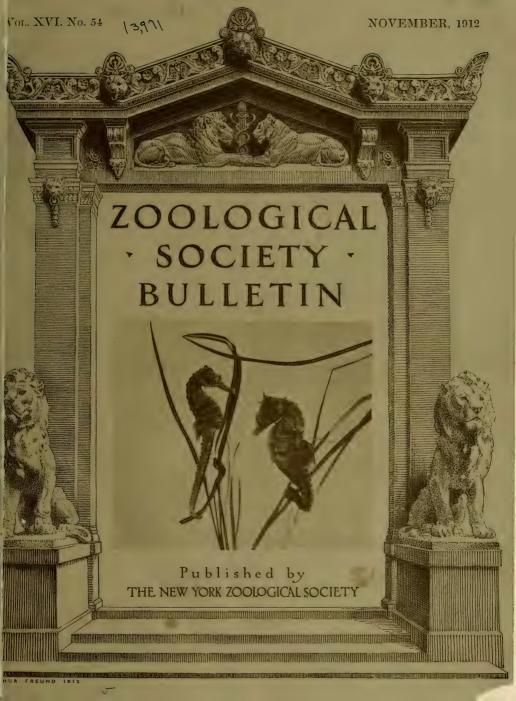
The publications of the Society are for sale at the prices affixed below. Address H. R. Mitchell, Chief Clerk, New York Zoological Park.

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"	"					.60	Bulletins—bi-monthlyYearly by Mail 1.00

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Publications and Post Cards of the Aquarium may be obtained by writing Dr. C. H. Townsend, Director, Battery Park, New York City.





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ZOOLOGICAL SOCIETY BULLETIN

AQUARIUM NUMBER

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Prepared and Edited by Dr. RAYMOND C. OSBURN

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ORANGE FILEFISHES IN THE NEW YORK AQUARIUM

ZOOLOGICAL SOCIETY BULLETIN

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Number 54

THE CRAYFISH

ONE of the inhabitants of fresh water are better known to the casual observer and few have been the subject of more study by naturalists and scientists than the crayfishes. These are popularly known by a variety of names such as crawfish, crawdad, cray, lobster, crab, etc. The origin of the word "crayfish" is interesting as an illustration of the changes which words sometimes undergo during the evolution of languages. Apparently from the Old High German word "Krebis" there have been derived the modern German word "Krebs," the Old French "crevice" from which has come the modern French "ecrevisse," and the Old English "crevis" or "creves," which has been corrupted into "crayfish" and still further into "crawfish."

Every country lad knows where and how crayfishes may be found, and is quite familiar with their propensity for stealing bait when he is fishing for the far more desirable suckers, catfish and shiners; and what barefooted urchin in the country does not possess among his treasures at least a few crab's-eyes or lucky-stones, as the calcareous concretions formed within the thorax are called? Though harmless enough, they are usually greatly feared by the small boys and girls who love to wade barefooted in the shallow streams and ponds. The bass fisherman fully appreciates the value of the softshelled stage as a tempting lure for the wily game.

Popular writers have, for the most part, overlooked the possibilities of the crayfish and references to this interesting animal outside of scientific literature are rare indeed. James Whitcomb Riley, who has been able to see something of poetic charm in many of the humble creatures of the woods and streams, evidently considers the crayfish as occupying the lowest limit of existence, for he pictures a treetoad utterly disgusted with the long and continued drought, which

> "Jest backed down in a crawfish hole Weary at hart and sick at sole."

Alfred Henry Lewis's "Crawfish Jim," though hamless, is not a particularly attractive character. Even the English language takes a fling at the little crustacean on account of his mode of backing out of difficulties, and "crawfishing" is widely and slightingly applied to this method of the human species in escaping from an unpleasant situation.

Various scientific monographs have been written on the structure, habits, distribution and relationship of the crayfishes, while their use as a laboratory type for the purpose of illustrating the crustacen has become a matter of course in the colleges and secondary schools of Europe and America. Yet in spite of all that has been written by the scientists, the natural history of the crayfish is but little known to the general reader, and it is commonly regarded as a useless and uninteresting animal, which may occa-



CRAYFISH, DORSAL SIDE

The abdomen is turned under as at the end of a swimming stroke.

sionally serve for bait or to furnish amusement for the youngsters, and which sometimes makes a nuisance of itself by burrowing into dams and levees, allowing the water to seep out.

Even the fact that the crayfish has a very considerable food value is known to but a small percentage of Americans. The crayfishes are all edible and are eaten in many parts of the world, and only the small size of most of the species has prevented them from being any less popular than the lobster as an article of diet. The large muscles of the abdomen, similar to those of the lobster, are the most valuable parts. Many a country boy has discovered that a luscious tidbit may be obtained by removing the big muscle and toasting it on a stick before his campfire. In Europe they are commonly used, and in some places are cultivated for market.

The special report on the fisheries of the United States contained in the last report of the Bureau of the Census, states that in the year 1908 the total catch of crayfish in this country was 666,000 pounds, netting the fisherman \$34,000—a little over five cents a pound. The states chiefly interested in this industry at that time were Louisiana, 88,000 lbs.; Oregon, 178,000 lbs., and Wisconsin, 348,000 lbs. But the Ore

gon crayfish (of the genus Astacus) are larger than the eastern species (of the genus Cambarus) and so command a higher price. Perhaps the absence of lobsters from the Pacific coast may have been a contributing factor, but at any rate the Oregon catch was valued at \$14,000, while the Wisconsin catch, though nearly twice as large, was valued at the same figure. While cravfishes may be taken by lines, nets and seines, the chief method of capture is the trap or pot, and, according to the census estimate, 606,000 pounds of the total were taken in this manner. In New York City the demand for cravfishes is confined almost entirely to the foreign population, who have learned abroad to appreciate the delicacy of this aquatic food. Yet a very considerable quantity is consumed here, and shipments are received from numerous sources. Dr. E. A. Andrews* is responsible for the statement that one-half million crayfishes are shipped to New York annually from a very limited region on the Potomac River.

The crayfishes belong to the decapod, or tenfooted crustacea, and are thus closely related to the marine lobster and prawn. They constitute a separate family, the Astacidae, which is represented in every continent (Africa excepted) and in many of the larger islands of the world. This family is divided into two sub-families: the Astacinae and the Parastacinae, limited respectively to the northern and southern hemispheres, with the exception that the genus Parastacus of South America ranges northward into Mexico. For some unknown reason, the crayfishes have been unable to adapt themselves well to the conditions of life in the tropics, and but few species are found outside of the temperate zones. Quite a number occur in Mexico, especially in the highlands where temperate conditions obtain.

The Astacinae contain three genera whose distribution is very interesting and the reasons for which are not fully understood. The species of Astacus occupy Europe and western Asia and the Pacific slope of North America, while the genus Cambarus is limited to North America east of the Rocky Mountains, and the closely related Cambaroides to eastern Asia. Thus each group, Astacus, and Cambarus plus Cambaroides, is divided into two widely separated fields, between which occurs a division of the other group. There is no overlapping of the groups to indicate that they have occupied the same region at the same time. The absence of crayfish from Africa is especially interesting in view of the fact that they occur in Madagascar. This, however, is in accord with the distribu-

^{*}The Future of the Crayfish Industry. Science, new series, vol. XXIII, pp. 983-6.

tion of certain other Madagascar animals, for example, the true lenurs, which flourish on this and other islands of the Indian Ocean, but not on the mainland.

The first important work on the North American crayfishes was that of Hagen* in 1871. Since that time Faxon and Ortmann have added greatly to our knowledge of the group. Hay† lists eighty-four species, only five of which belong to the genus Astacus, found west of the Rocky Mountains. The remaining seventy-nine belong to Cambarus, found east of the Rockies. Nine species, plus three varieties, were listed for Mexico, Central America and the West Indies. More recently several additional species have been described.

Ortmann't has divided the cravfishes of North America according to their habits into three groups: I, river species; II, mountain stream species, and III, burrowing species. While no sharp distinction can be made between these groups, it is true that many species are confined entirely to larger streams and lakes, others are never found except in small cold streams and springs, while others are entirely burrowing in habit. The burrowing species are often found at considerable distance from any open water, in lowlands where they can have water the year round by digging holes, which, in extreme cases, extend to a depth of three or four feet. Some species, known as chimney builders, deposit the earth brought up in constructing the burrow in a ring of pellets around the opening, sometimes extending to a height of ten to twelve inches and a diameter of twelve to eighteen inches, though usually the piles are much smaller. According to Ortmann (l. c., p. 42) there is no evident purpose in constructing circular mounds. The cravfish simply adopts the easiest way of getting rid of the dirt removed from the burrow. Each hole contains only one individual, except during the time the young remain with the mother and also at the mating season, when a pair may occupy the same burrow. The holes are often found sealed up by pellets of earth placed at or near the mouth, and this is especially true in winter when they may remain sealed for three or four months.

Crayfishes are all more or less nocturnal in habit, though some of the species of the larger streams and ponds wander about a good deal during the day and are not at all averse to tak-



Under side showing abdominal legs or swimmerets. The last two pairs of walking legs end in spikes, the others have pincers for holding the food.

ing food in the daytime. Other species confine their activities to the night and lie hidden away under stones or in burrows the rest of the time. Four species found in the United States are blind and inhabit caves. The best known of these is Cambarus pellucidus (Tellkampf) of Mammoth Cave, Wyandotte Cave and other caverns of Kentucky and Indiana. The eyes of crayfishes are compound (i. e., composed of numerous facets) like those of insects and other crustaceans. The facets are arranged in a hemispherical form on the end of the movable eye-stalk, but in blind species the facets are wanting.

The crayfish can walk in any direction, backward, forward or sideways, by means of the thoracic legs, though progress by this means is slow. Especially is this true on land, where, not having the buoyancy they possess in the water, they drag themselves along in a laborious fashion. In swimming the crayfish uses his abdoment after the same manner as the lobster, and a quick movement of the tail will send him darting backward through the water for some distance. When cornered he will defend himself vigorously with the large pincers, but he usually

^{*}Memoirs of the Museum of Comparative Zoology of Harvard College, II, No. 1.

[†]Synopsis of the Astacidae of North America. American Naturalist, December, 1899.

[†]Crayfishes of Pennsylvania. Memoirs of the Carnegie Museum of Pittsburgh, vol. II, No. X, 1906.

considers discretion the better part of valor, and escapes if opportunity offers. The method of swimming has two advantages; he presents his large fighting claws to his enemy while fleeing, and when cover is reached he can enter it backward without stopping to turn around and blocks pursuit with his claws. In fighting he possesses some of the qualities of the bulldog, and doesn't always know when to let go. If a stick is poked at him, he may attack it with such vigor that he can be drawn from his retreat, or even out of the water before it occurs to him that he can release his hold. The species which live on a muddy bottom would seem to have taken a lesson from the Hebrew exodus, and learned to cover their retreat by a pillar of cloud. In this case, however, the cloud consists of mud which is stirred up to such an extent by striking the tail on the bottom that their whereabouts is effectively obscured. When, after a few minutes the mud is settled, the cravfish may be seen half buried under it, his colors completely obscured by it, and his slowly moving antennæ and watchful eves the most conspicuous parts observed.

In New England crayfishes are not common, and only one species (C. bartonii) has been reported. West of the Adirondacks and Catskills they become very abundant, and this is especially true of streams having their source in the Alleghenies and in the great central basin of the United States. No less than twenty-five species and varieties inhabit the Ohio River basin, which is perhaps the richest area in the world in species of crayfishes. Species are numerous in the South Atlantic and Gulf States, and also in the region of the Ozark Mountains west of the Mississippi.

In the number of individuals these regions are no less rich than in number of species. A single haul of a fine-meshed seine will often yield hundreds of them. In the writer's experience in collecting fishes in Ohio, the cray-fishes were frequently so abundant as to materially impede the progress of the work. A half-bushel of crayfish would often have to be looked over and the smaller fishes separated from the clawing and snapping mass, and when recovered, were often found injured by the large pincers of their armored fellow captives.

Thus far only a single species has been reported in the region about New York City*. This is the widely distributed Cambarus bartoni (Fabricius), which occurs in eastern Canada and eastern United States south to North Carolina and west to Indiana, and which is the only

Cambarus limosus is now abundant in the artificial lakes of New York City. On seining trips to these lakes, made by employees of the Aquarium for the purpose of obtaining fishes, they have been taken readily, sometimes a couple of dozen or more at a haul. Whether they occur in the lowland streams of the vicinity has not been determined. Neither is it known whether their appearance here is of recent date, or whether they have merely been overlooked. At any rate, there are no records of occurrence in this vicinity, and the study of the specimens in the local museums reveals only very recent captures from these same lakes.

As to the possibility of recent distribution to the eastward from the Delaware River system, it would seem that this may have been facilitated by means of the Raritan Canal. In this case their appearnace in Central Park Lake would have necessitated the species distributing itself across the brackish waters of New York Bay or the lower Hudson River, and to get to Prospect Park Lake the East River would also have to be crossed. No cravfishes are found in salt water, however, and this fact would seem to be opposed to such a distribution. Experiments have been made at the New York Aquarium to test the resistance of this species to the harbor water, and it has been found that in brackish water having a specific gravity of 1.14 degrees they will live for many days. If investigation should prove that the species has distributed itself commonly in eastern New Jersey, the hypothesis that they have gained access to the park lakes through the brackish water of the

species reported from New England. Recently the New York Aquarium has obtained an abundance of specimens of another species, C. limosus (Rafinesque), from Central Park Lake, New York City, and Prospect Park Lake, Brooklyn. This species has not hitherto been known outside of the Delaware, Potomac and Susquehannah river drainages, except for one locality, Redbank, New Jersey, in the New York Bay drainage (see Ortmann's "Crayfishes of Pennsylvania"). Its appearance in the park lakes of New York City thus extends its range considerably. Dr. Ortmann has called my attention in a recent letter to the fact that this species has been introduced into a lake at East Hampton, Connecticut, and also that it has been naturalized, locally, in Germany. Cambarus limosus is essentially a lowland species of the rivers and ponds, while of C. bartoni, Ortmann (l. c., p. 447) says "Ecologically this species is a form of the rapid and cool waters of the uplands and mountains, living preferably in small streams and even in springs,"

^{*}Paulmier. Higher Crustacea of New York State, Bull, 91, New York State Museum, 1905.



NORMAL AND PALE PHASES OF Combarus limosus

The pale form is really much lighter than it appears in the cut, being nearly white. Photograph by R. C. Osburn.

lower Hudson would gain considerable support. There is a possibility that they may have been distributed accidentally among water plants, or that they have been purposely carried by some one. At any rate there is no question but that they have permanently adapted themselves to the local waters.

Our two local species of crayfishes may be readily distinguished as follows: $Cambarus\ limosus\ has$ a strong spine on either side of the rostrum, or pointed projection between the eyes, while $C.\ bartoni$ has no marginal spine on the rostrum. In $C.\ limosus$ there is a patch of spines on either side of the carapace in the region of the cervical, or neck, groove, while in $C.\ bartoni$ this region is only slightly granulated. There are various other well-marked differences in structure, form and color of the body, and especially in the appendages.

A distinct color variation not hitherto noticed in the species has appeared in C. limosus from this vicinity. Faxon* and Ortmann (l. c., pp. 355-6) have carefully described the colors as usually found, which briefly stated are: Chief color olivaceous with large blotches of dark green; under parts pale. Each segment of the abdomen is marked above by paired brown (burnt sienna) spots and there is a brown spot on each side below the eye. The tips of the big pincers are ferruginous and behind this is a ring of dark green or nearly black.

The color variety is not a case of albinism, for the eyes appear to be as fully pigmented as in the typical form, but there is an almost total suppression of the normal body coloration. The ground color is almost white, but it is tinged

*Revision of the Astacidae, Memoirs of the Museum of Harvard College, vol. X, p. 88.



CRAYFISH

In the water the crayfish balances himself easily on the walking legs—Photograph by R. C. Osburn

with pale bluish on the upper part of the thorax and abdomen and on the legs. There is no indication anywhere of the dark green or blackish pigment, and the only red to be observed is a faint tinge of this color in the region where the abdominal spots occur in the normal form. No structural differences have been observed.

Cases of partial albinism or suppressed development of color have been noted occasionally in various species of animals. Of the crayfish Dr. Ortmann writes thus in reply to a recent let-"The pale blue color-variety is very remarkable indeed. Bluish specimens, as a colorvariety, have been described in European species of Potamobius (Astacus), but have always been regarded as extraordinary cases. I have occasionally observed slate-blue specimens in Cambarus bartoni, but always single individuals only. I have received specimens of a whitish variety of C. virilis from Sandy Lake, Peterboro County, Ontario, Canada, a lake remarkable for its limestone deposits, but here they are all said to be of this color.'

More than two dozen specimens of this pale phase of *C. limosus*, of both sexes, have been taken at different times in Prospect Park Lake, Brooklyn, during the past two summers, among about two hundred of the ordinary color phase—no exact counts were made.

What may be the cause of the suppression of the ordinary colors in this and similar cases of partial albinism is not known. Whether it is due to some congenital variation (mutation or saltation), which would then be hereditary, or whether it is due to some physiological condition developed during the life of the individual is unknown, and could only be determined by breeding experiments. From the number of specimens and from the fact that they were taken living with the ordinary variety, it seems probable that the difference is congenital and due to the suppression of a color-developing factor. This assumption is further borne out by the fact that color is not entirely absent, but merely suppressed in large part.

The reproduction of the crayfish is very interesting and has been the subject of much study in this country, especially by Professor E. A. Andrews,* of Johns Hopkins University.

It has long been known that the crayfishes have no larval surface-swimming stages as do their marine relatives, the lobsters and prawns. As early as 1755 von Rosenhof noticed that the young of the European crayfish are similar to the mother and that they remain with her for a time after hatching. Rathke in 1829 showed that the young emerges from the egg in essentially the adult form and so has no metamorphosis. Later, however, Huxley (1879) proved that the young before the first moult are not exactly similar to the adult, but differ in the lack of setae, or bristles, and in the form of the first and sixth abdominal appendages. Thus it will be seen that there is only a slight degree of metamorphosis and of a different sort from that seen in the marine crustacea.

The reason for the climination of the freeswimming stages is probably to be found in their adaptation to a special habitat. If a surfaceswimming stage were present, as in the lobster,



A FEMALE CRAYFISH
Showing method of carrying the eggs.
Photograph by R. C, Osburn,

the young of the mountain stream species might be carried into the larger streams, while those of the inhabitants of the lowland streams might even be carried out to sea at this period.

The eggs of the crayfishes are regularly laid in the early spring and the time of laying for

^{*}The Young of the Crayfish, Astacus and Cambarus. Smithsonian Contributions to Knowledge, vol. XXX, pp. 1-79, plates 1-X.

any species may extend over a considerable period—in Cambarus bartoni, for example, from March 15th to May 15th. Chidester* has observed that in C. bartoni var. bartoni there is also an autumnal spawning season beginning with the latter part of September and extending through October and November. Although Chidester does not discuss the matter, this probably does not mean that two broods are produced in a season, but that some of the females mature their eggs in the spring and others in the fall.

Andrews† has carefully studied the reproduction of Cambarus affinis. Three hundred to six hundred eggs, of a diameter of about one and one-half millimeters, are produced. These, as in the lobster, become attached to the under side of the abdomen, especially on the swimmerets, by adhesive portions of the egg envelopes. The eggs are laid in April and May and hatch in a few weeks, the time apparently depending on

the temperature of the water.

When first hatched each young crayfish is attached by the telson thread, a string of cuticle fastened at one end to the telson or last abdominal segment and at the other to the now empty egg membrane. In this condition they remain for two days, when they moult and pass from the first stage to the second. In the second stage also the young are inactive and remain with the mother, but the telson thread is lost and they remain attached by grasping the old egg cases and the abdominal setae with their pincers. During this time they eat nothing and the yolk sac is gradually absorbed. After six days in this condition the skin is again moulted and the young emerge in the third stage. By this time they have taken on the form of the adult, except that the proportions are somewhat different.

The third stage marks the beginning of active life, and, while the young remain with the parent more or less closely for a week or so, they gradually wander away and begin an independent existence. By fall the young ordinarily reach a length of about two inches and are sexually mature, and the first pairing takes place in October or November of the first year.

After this there are no more moults and consequently no growth until the young have been

produced in the following spring.

How long crayfishes live has been ascertained for only a few species. Andrews found no specimens of *Cambarus limosus* living after the third summer, and Ortmann states that, except in occasional individuals, three years constitutes

pawning season beginning of Some of our smaller species do not attain a greater length than a couple of inches. C. November. Although Chimosus reaches a maximum of about four

live six years.

greater length than a couple of inches. C. limosus reaches a maximum of about four inches, while the European Astacus fluviatilis grows to nearly eight inches. The largest species known is Astacopsis franklinii, found in small streams of Tasmania, which reaches a weight of eight or nine pounds and is thus about

the life period of C. obscurus. The European

cravfish Astacus fluviatilis, has been known to

Size is dependent largely upon the species.

equal in size to the European lobster.

The crayfish has many natural enemies. Perhaps the most destructive are various species of fishes, the larger salamanders, such as the mudpuppy (Necturus) and hellbender (Cruptobranchus) and water-snakes. No doubt the semi-aquatic mammals take their toll and the raccoon is said to be particularly fond of them. Many aquatic birds feed upon them. They are parasitized by leeches, copepod crustaceans and worms. The shells are often overgrown with diatoms and algae, and those from our park lakes are often covered with a profuse growth of a large colonial protozoan (Epistylus). It is doubtful if these do any particular harm, except, perhaps, to impede the progress of the cravfish when the growth is abundant. Furthermore, all crayfishes are given to cannibalism to some extent, and not only are young devoured by the adults, but full-grown specimens, when shedding, may be attacked and devoured before the new shell has had time to harden enough to serve for a protection.



CRAYFISH COVERED WITH PROTOZOANS One-half natural size. Photograph by R. C. Osburn.

^{*}American Naturalist, May, 1912.

[†]Smithsonian Contributions to Knowledge, vol. XXXV, 1907.

BULLETIN. ZOOLOGICAL SOCIETY

Departments:

Mammal W. T. HORNADAY. Aquarium C. H. TOWNSEND. RAYMOND C. OSRURN.

Reptile RAYMOND L. DITMARS. Bird C. WILLIAM BEEBB.

LEE S. CRANDALL.

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France P Sampony Editor

Vol. XVI. No. 54

NOVEMBER, 1912

Minute adopted by the Executive Committee of the New York Zoological Society, held on Tuesday, the eighth of October, One thousand nine hundred and twelve.

Resolved, That the Executive Committee learn with deep regret of the death of Mr. Hugh J. Chisholm, a member of the Board of

Managers since 1900.

From the time of the early development of the New York Zoological Park, when interest and support were most needed, Mr. Chisholm always displayed the keenest interest in the great undertaking and readiness to assist in its development in every way. He attended all the meetings of the Board, and always expressed great pleasure in the progress of the work. His generosity and good-will were a source of strength to the Executive Committee, and it is with a sincere sense of loss that this entry is made upon the minutes.

AMERICAN FISHERIES SOCIETY

The annual meeting of this society was held in Denver, occupying three days, from September 3d to 5th, inclusive, Mr. S. F. Fullerton, of St. Paul, Minn., presiding. Fifty-three members were present, a good attendance considering that a majority of the membership reside in the eastern states.

The following papers, embracing many fields of fisheries work, were read and discussed at the meeting:

A Defense of the Humble Dogfish. By George Wm.

Protection of the Undersized Fish. By G. H. Thomson.

The Black-Spotted Mountain Trout. By S. E. Land.

The Whitefish. By C. H. Wilson. The Whitefish. By T. S. Palmer.

Report on Progress of the Building of New Pondfish Hatchery in Kansas. By L. L. Dyche. The Kansas Fish Law. By L. L. Dyche.

Report on Oregon Fish and Game Laws. By C. K.

Cranston.

The Catfish as a Host for Fresh-water Mussels. By A. D. Howard.

The Oyster and Fish Industry of Louisiana. By W. O. Hart.

Some Suggestions Looking Toward the Enlargement in Scope and Membership of the American Fisheries Society. By H. Wheeler Perce. Pollution of Public Waters in Massachusetts. By

G. W. Field.

Demonstration of Free Pearls of Forced Production. By R. E. Coker.

Grayling. By H. D. Dean.

Preservation of Our Fish Fauna. By Henry B. Ward.

Recent Legislation on the Fur Seal Fishery. By C. H. Townsend.

Fishways for the Rank and File. By O. W. Buck. Federal Control over Fish in Boundary Waters. By H. Hinrichs.

The following officers were elected for the coming year:

President, Dr. Charles H. Townsend, Director of the New York Aquarium.

Vice-President, Prof. H. B. Ward, University of Illinois.

Recording Secretary, Mr. Ward Bower, U. S. Bureau of Fisheries.

Corresponding Secretary, Dr. Geo. W. Field, Massachusetts State Fish Commissioner.

Treasurer, Mr. C. W. Willard, Westerly, R. I.

The 1913 meeting will be held in Boston, but the exact date has not yet been determined.

SPECIES OF FISHES IN THE WORLD

Questions are frequently asked at the Aquarium concerning the number of species of fishes in this region, in North America and in the In any locality where the fishes have been well studied, it is an easy matter to answer such a question. Thus, within fifty miles of New York City there have been taken two hundred and thirty-nine species, according to Mr. John T. Nichols, of the American Museum of Natural History, who has carefully collected the records of occurrences. Of course, this number may be increased slightly in coming years, especially by the capture of marine wanderers accidental to our fauna.

The number of North American species can only be estimated somewhat roughly at present, for the reason that in many regions the fishes have not been studied with sufficient care. Jordan and Evermann, in their Report upon the Fishes of North and Middle America, list about three thousand five hundred species. Since the appearance of this work a number of additional species have been described. How many fishes yet remained unknown, how many of those listed are pure synonyms or should be classed merely as variations, cannot be known until many more years of study have been given to the subject.

Mr. W. W. Henshaw, Chief of the Biological Survey at Washington, has recently published an estimate of the probable number of species of vertebrated animals in the world (*Science*,

Sept. 6, 1912, p. 317) as follows:

Mammals	
Birds20,000	
Crocodiles and turtles 300)
Lizards 3,300	
Snakes)
Frogs and toads	
Salamanders 200	
Fishes12,000)
'Total47,200)

As Mr. Henshaw points out, such estimates must necessarily be little more than guesswork, except, perhaps, in the birds and mammals which are better known than the other groups. In view of the fact that some three thousand five hundred fishes are listed for North American waters north of Panama, the total of twelve thousand for a world estimate appears rather small. To be sure, many species, especially of the ocean waters, are very widely distributed, and many undoubtedly yet remain to be placed in synonymy. Yet, when one considers the vast regions of the earth-central portions of South America, Africa and Asia, the islands of Oceanica and depths of the ocean, in all of which the fish fauna is very imperfectly known -it would seem that Mr. Henshaw's estimate is, to say the least, a very conservative one.

NEW MEMBERS

June 6, 1912, to October 8, 1912

ANNUAL MEMBERS

Mrs. C. C. Auchincloss,	Mrs. H. K. Pomroy.
Mrs. Alvin W. Krech, Mrs. Frederick H. Eaton.	
Mrs. Joseph Palmer Knapp	
Mrs. E. LeGrand Beers,	
Mrs. DeLancey Kane,	Maunsell S. Crosby,
Dr. J. H. O'Connell,	M. M. Hansford,
Mrs. Augusta Booth,	Theodor A. Simon.
Baroness R. de	Graffenried.

THE GARDEN POOL AND THE MOSQUITO

T IS a matter of common knowledge that many species of small fishes have a fondness for the larvae of the mosquito as an article of diet. The result of this is that open streams and ponds where fishes thrive never produce large numbers of this irritating and often dangerous pest. Unfortunately for humanity the mosquitoes are not as particular where they live as fishes are, and will thrive in many places unfitted for fish life. Apparently no puddle of water is too small or too foul to breed mosquitoes, while fishes, even catfishes and carp, have their limits. Any temporary mud-hole holding water for a couple of weeks may yield a plentiful crop of mosquitoes, and even a tin can, before it has time to go dry after a heavy rain, may furnish enough to cause a household considerable worry.

The rain barrel can be covered, the tin can emptied, the puddle drained or oiled, but what about the fountain and the lily pool, which, even in the heart of the city, is maintained for the beauty and interest, and apparently also for the mosquitoes it affords? The garden pool cannot be oiled like the stagnant marsh pool. To do so would destroy its beauty; to drain it dry enough to kill the mosquitoes would also mean the killing of the plant life contained in it. The one solution of the problem is the introduction of small fishes in sufficient numbers

to destroy the wrigglers.

Without question, the best fish for this purpose, all things considered, is the goldfish. The common variety of goldfish is hardy and well suited by centuries of cultivation for life in such pools. They are easily obtained from dealers in fish and aquarium supplies and will stand shipment in a small amount of water better than most any other ordinary fish—and "commons" are cheap. A few small specimens introduced into a pool will be sufficient to keep the mosquitoes in check, for it has been shown by abundant evidence that the young goldfishes will select the wrigglers for food, even in the presence of various sorts of prepared fish foods.

In the fall, when the water is turned off to drain the pool, the fish may be transferred to indoor aquariums, or they may be returned to the dealer and a new supply purchased the following spring. The lily pond and fountain should not be permitted to become a nuisance to the household and the neighbors when the addition of a few common goldfishes will not only remove the mosquito larvae before they transform, but will at the same time render the pool

much more attractive.



SPINY DOGFISH

Embryo still attached to the egg; reduced one half.
Photograph by R. C. Osburn.

FISHES THAT PRODUCE LIVING YOUNG

THE statement that some fishes bring forth their young alive is usually a startling one to the person who is not familiar with ichthyological lore. The common sorts of fishes, it is true, lay their eggs either broadcast in the water or in various makeshifts for nests, and the fertilization takes place after the eggs are laid. But in a number of groups the eggs are retained until the young are developed, and it is of interest that these viviparous fishes are often not closely related, but belong to widely separated families. The development of the life-bearing function in such unrelated groups forms one of the best examples of parallel evolution.

It is an equally interesting fact that most fishes that bear living young are closely related to others that reproduce in the usual manner; they are, therefore, individual species or genera which have adopted this mode of reproduction without undergoing a sufficient change in structural characteristics to separate them from the parent stock. Thus the sharks, rays and killiefishes have representatives of both classes. The surf-perches (Embiotocidae) of the Pacific Ocean represent a single family in which all the members are live-bearing. Among the sharks, the majority of the species are viviparous, but the Port Jackson and bullhead sharks lay large eggs with tough, horny shells. The majority of the rays or skates lay eggs with horny shells, but certain members, as the seabat or sea-devil (genus Manta) and the butterfly ray (genus Pteroplatea) bring forth living young. Among the killie-fishes, the more common genera (Fundulus and Zygonectes) lay eggs, but in the genus Gambusia, etc., living young are produced.

In the viviparous sharks and rays, the eggs are very large-as large as those laid by their oviparous relatives. The eggs contain sufficient nutriment, or nearly so, to bring the young to a proper condition for birth and but little nourishment is ordinarily derived from the mother. In the live-bearing bony fishes where the eggs are small, the young receive their nourishment, or a portion of it at least, from the maternal tissues. In the surf-perches, particularly, as shown years ago by Professor Eigenmann, the eggs are reduced in size to such an extent that they contain very little yolk, the nourishment in this case being derived from the membranes of the mother. The eggs of the viviparous fishes are always comparatively few in number for very good reasons. First, since the young at birth are larger and more highly developed than those hatched in the ordinary way and so are better able to take care of themselves, it has not been necessary to produce such a large number in order to continue the species. Second, a larger number of young would be too great a strain upon the vitality of the parent, which must be preserved if the young are to be produced in good condition. It is as though each type of fish possesses a certain amount of energy for reproduction, which, in the case of egg-laying fishes, can be devoted to the production of a large number of eggs, but which in the live-bearing fishes is devoted to the special nourishment and protection of a much smaller number.

The common little shark, known as the dogfish, produces several young at a time. These, when born, are about eight inches in length, while the adult fish reaches not more than three feet. It will thus be evident that the younger generation is well on its way to maturity at the time of birth and has passed most of the dangers that surround the ordinary type of fish during its hatching and growth periods.

The surf-perches again seldom reach more than a foot in length, and bring forth a small number of young, which range in length according to the species from one and a half to two and a half inches, so these young are well on the way to maturity.

Among the killie-fishes, the top-minnow (Gambusia affinis) of our southern Atlantic States bears a larger number of young, but these at birth are only about one-third of an inch, while the adult mother reaches a length of about two inches. According to a recent article in Science, by Dr. Hugh M. Smith, the average number of young in families produced in June

is one hundred, individual cases ranging from eighty-five to one hundred and thirty-four. Dr. Smith suggests that two broods are produced in a season, since the young are known to make their appearance both in spring and late summer. The second brood is much smaller in number, consisting of about two dozen, ranging, in the fish examined by him, from eighteen to thirty.

The smaller fresh-water live-bearing fishes are easily kept and reproduce readily in captivity. They are, therefore, much in demand by fish fanciers and are among the most interesting of the many species of aquarium fishes.

A FASTIDIOUS SPIDER-CRAB

LL young spider-crabs decorate the carapace and legs in the attempt to render themselves less conspicuous in their environment (see the Bulletin for November, 1911). The specimen figured in the accompanying cut exhibited rather unusual taste in the matter of color as well as in the selection of material. When brought into the Aquarium it was covered with scraps of seaweed. It was placed in a tank in which there were few weeds, but a great many small, orange-colored anemones (Sagartia leucolena) attached to pebbles. Apparently perceiving that algae were no longer in style, the crab in a short time discarded them and proceeded to adorn himself with the anemones. The polyps seemed as well contented on the crab as they did on the stones, expanding and feeding as well as though it were their natural habitat. At the time the photograph was made, the crab, which was a trifle over an inch long, was carrying eleven anemones about with him.

THE SWORDFISHING INDUSTRY

CCORDING to the Fishing Gazette the swordfishing has been better the past summer than for many years. At Boston, where nearly all of the swordfish catch is landed and marketed, seven hundred and seven were brought in in one day, and on one other day six hundred and eighty-four of these big fishes were landed at T Wharf, the fishing dock. One schooner brought in two hundred and two at one time. This is a profitable business when one considers that the average weight of the fish is about two hundred pounds, and that they bring usually from eight to eleven cents a pound. The total quantity landed at Boston during the month of July, 1912, was 1,014,350 pounds, valued at \$93,370, or a little over nine cents a pound.



SPIDER-CRAB

Decorated with sea-anemones; slightly reduced.
Photograph by R. C. Osburn,

The swordfish is the largest fish, except the great tuna, regularly taken for market. Individuals weighing over four hundred pounds are rarely taken, but there is a record of one weighing seven hundred and fifty pounds.

They are occasionally taken on trawl lines, but the harpoon is the usual means of capture. They usually swim near the surface, above which the dorsal fin often projects. A sailor at the masthead keeps watch for these signs, and when a fish is sighted the fishing vessel approaches until the harpooner on the "pulpit," a small framework at the end of the bowsprit, is within striking distance. To the head of the harpoon is fastened a light rope with a keg made fast to the end to serve as a float.

After the fish has tired himself out in his struggles to escape from the harpoon and the float, the fisherman approaches in a dory and finishes him with a lance. Not infrequently, however, the fish retaliates by attacking the boat with his sword. The strength of the infuriated fish is such that the sword will easily pierce the bottom of a skiff, or even of a schooner, for that matter, as the records abundantly testify. I recall seeing a skiff which had been struck in such a manner that the sword went completely through the boat, piercing both sides.

The favorite fishing grounds are the off-shore waters from Block Island to Cape Cod and northward, and it is no uncommon sight on passing the region about No Man's Land, off Martha's Vineyard, or the Nantucket Shoals, to see numbers of small fishing vessels, equipped for swordfishing, cruising about with a man at the masthead on the lookout for swordfish. The small schooners and sloops which engage in other fishing at other seasons of the year generally carry swordfish tackle, and often when on other business are ready for a try at the big fish.

THE BIG GROUPERS

MALLER specimens of the Spotted Grouper or Jewfish (Promicrops guttatus) have lived remarkably well at the Aquarium, so it appeared probable that adults would do equally well. Consequently about a year ago a two-hundred-and-fifty-pound specimen was brought from Key West, Florida, as a gift from Mr. Danforth B. Ferguson.

Up to that time this was the largest bony fish ever exhibited at the Aquarium, and the largest fish of any kind with the exception of an occasional large shark. On account of its size this specimen could not be accommodated in a wall tank with the other groupers, but was placed in the large center pool with the stur-

geons, drumfishes and sand sharks.

On April 13, 1912, six more large groupers, most of them considerably larger than the first, were brought from the same locality and placed in the same pool. One of these died on September 8th, and though by no means the largest of the lot, it measured six feet three inches in length, and weighed, in a very emaciated condition, two hundred and thirty pounds.

Though accustomed in their natural habitat to very pure sea-water of a high salinity, they have adapted themselves well to the harbor water supplied to the center pool, which has only half the salinity of pure sea-water and which is filthy beyond comparison with that of the

Florida Keys.

It is thus demonstrated beyond question that these giants among the finny tribes are hardy and adaptable in confinement, and we predict that they will become popular as aquarium exhibits in other institutions than our own.

OUR BLACK-SPOTTED TROUT

THE trouts of western North America present an exceedingly difficult problem for the systematist, and authorities on the group are by no means agreed as to the status of many of the forms which have been variously regarded as species, varieties or merely local phases.

The cut-throat or black-spotted trout, like most of its relatives, is extremely variable, and as its range is very great, extending from Alaska to California and from the head-waters of the Yellowstone to the Pacific, some widely different conditions or habitat are presented. It may be that some of these differences are due to direct effects of the environment, but probably the modern students of heredity would re-

gard the species as one possessed of a great complex of characters, which, under geographical isolation, have become segregated or sorted out in various ways to produce the variations in color, etc., which are observed.

The trout of Yellowstone Lake and neighboring waters was originally described as a separate species, Salmo lewisi, in honor of Captain Meriwether Lewis, the leader of the Lewis and Clark expedition. Later it was considered a variety of Salmo clarki, the cut-throat or black-spotted trout. All the tendency of recent years has been to merge it completely with clarki, and drop the varietal name.

The manner in which the species has become distributed in the head-waters of the Yellowstone from the Snake River by way of Two-Ocean Pass, has been interestingly described by Dr. B. W. Evermann. It appears that the cutthroat trout is the only species of fish inhabiting the waters of Yellowstone Lake. Certain other species have been introduced, but according to Messrs. Thompson and Leach, of the United States Bureau of Fisheries Stations at the lake, none of those introduced are ever taken, so it is presumed that they have failed to adapt themselves to these waters.

Every summer the Aquarium receives eggs of the cut-throat trout through the kindness of the United States Bureau of Fisheries, and the past season the writer had the privilege of seeing the work of taking the eggs at the lake stations. The Yellowstone trout, like most lake-dwelling trout, run into the shallow waters to breed, and where possible ascend the small streams which empty into the lake. Often the way is barred by shallows in the streamlets, but, undismayed by difficulties that ordinarily they would not attempt, the fishes, prompted by the breeding instinct, attempt to pass over ripples so shallow that swimming is impossible, and progress must be made, if at all, by a series of flops and struggles over the uneven gravel and stones of the stream bed. The writer observed one such shallow, where, in perhaps the space of a square yard, about a dozen trout were attempting to pass by this method from one pool to the next higher. The water was so shallow that the fishes were more than half exposed to the air, and were compelled to lie on one side between struggles. Occasionally a fish would flop out upon the dry gravel. However, the large number of fishes in the pool above proved that many, if not all, that made the attempt had been successful. In some pools the fish were so numerous as to render the bottom scarcely visible, and to capture them to obtain eggs meant only dipping them out with a hand-net.

The morning before my arrival at the lake, Mr. Thompson had taken three hundred thousand eggs. The Yellowstone trout yield on the average not more than one thousand eggs, so to secure the above number it had been necessary to strip at least three hundred females. After fertilization, the eggs, which are orange in color and about the size of small peas, are placed two or three layers deep in wooden trays with a wire screen bottom, and the trays are set in running water.

The eggs when in this condition do not stand transportation as well as they do after the embryos have partially developed, so they are kept at the lake until they are eved, that is, until the eyes af the developing embryos are visible as black specks in the eggs. In this condition they may be shipped, with proper care as to temperature and handling, to any part of the world. For transportation from the lake the travs are packed in ice in the shipping crates and hauled by express wagons sixty-five to seventy miles to the nearest railroad station at Gardiner, Montana. From here they go by rail, usually to the United States Fisheries Stations at Bozeman, Montana, and Spearfish, South Dakota, for further hatching, or they may be shipped elsewhere. All that is required is that the eggs be kept moist and the temperature low.

The eggs received at the New York Aquarium make, first, the long drive out of Yellowstone Park, then a twenty-five hundred mile trip by rail. On their arrival the trays are again placed in running water, maintained at a proper temperature, and the process of development, which has been delayed by the cold during the shipment, goes forward again to its completion.

Up to the period when the young fishes are planted in streams and lakes to look after themselves, the work of the fish culturist, the product of modern scientific methods, is far more certain of its results than is the work of the agriculturist or horticulturist. When our visitors view the black-spotted trout hatched and reared in the Aquarium, we beg that they will recall not merely the long journey, but also the scientific studies that have made possible such results.

THE ORANGE FILEFISH

NE of the most unique fishes of our fauna is the Orange Filefish (Alutera schoepfi), known also by a variety of local names, such as foolfish, leather-jacket, hambag-fish, old maid, living skeleton and sunfish. The name filefish is derived from the serrated character of the dorsal spine, which is somewhat like that



JAWS OF ORANGE FILEFISH

Jaws, fully opened, and teeth of Orange Filefish, enlarged about one-half. Photograph by R. C. Osburn.

of the trigger-fishes, to which the species is closely related. The term foolfish was undoubtedly applied on account of the peculiar facial expression, and the actions of the fish in swimming tend to strengthen the application.

The color of the adult fish is usually a light orange overlaid with irregular brown blotches, but a great amount of variation is observed, and sometimes when the brown is wanting the fish has a startling resemblance to an animated omelet. The filefish, along with the triggerfishes, has been cited as an example of warning coloration, their striking hues being supposed to signal the fact that the flesh is poisonous. The scales are very small and covered with sharp prickles which give to the skin a texture not unlike the shargeen of the shark.

In form the fish is very deep and extraordinarily thin so that the prominent features of the skeleton are often observable externally, and the common name living skeleton is rather appropriate. The upper part of the head is remarkably retracted so that the eye is situated almost under the dorsal spine and above and posterior to the gill opening and the pectoral fin, while the latter is anterior to the hinder end of the very oblique gill opening. The lower jaw is protruded to such an extent that its teeth are directed strongly backward.

The position of the small mouth is such that the fish must assume very unusual positions in feeding. In nature they find their food about piles, rocks and in similar situations, and they feed upon corals, hydroids, bryozoa, mollusks, crustacea, seaweed, etc., which they cut up by means of the sharp, incisor-like teeth. Only when the food is above them can they take it in a horizontal position; if it is in front of them they must turn obliquely downward, while if it

it is below them they must stand on their heads to secure it. In the Aquarium they may be even seen to turn partly over backward to pick food from the bottom. Mr. W. I. DeNvse, who has observed them feeding in nature, informs me that these positions are habitual with them. The teeth of the filefish are very peculiar, but well adapted to the function of cutting. In the lower jaw there is a single series of sharp-edged incisor-like teeth. These are opposed to a double row of teeth in the upper jaw which are so arranged that they present a single cutting edge. The lower jaw closes inside of the upper in such a way that an admirable pair of shears is formed, and the trenchant function is further increased by the serrated edge.

The bones forming the bases of the fins are very strong, especially the anterior ones of the dorsal and anal series, which are remarkably enlarged. The pelvie fins are entirely wanting, but the pelvic girdle is modified to form a strong brace consisting of a single bone extending from between the jaws, where it is attached, the full length of the abdomen, to which it lends support and protection. The ribs are short and very strong and are broadened posteriorly to overlap, suggesting the uncinate processes of the ribs of birds.

In the Aquarium the tail is used almost entirely as a rudder, and progress is made in an awkward-appearing fashion by means of sculling with the pectoral fins and by the undulatory motion of the dorsal and anal fins. These movements are reversed in swimming backward. When rapid progress is desirable the tail is used in the manner usual in fishes.

While the orange filefish is known from the Gulf of Mexico to Cape Cod, and even as far north as Salem, Mass., it is naturally a fish of the warmer seas and is found in this region only during the warmer months. Whether they migrate southward, or are killed by the cold at the approach of winter, is not known. young, three inches and over, are fairly common along the coast of Long Island and southern New England every summer, especially in September, but the adults are more rare. few adults are usually taken each season at Gravesend Bay and at Woods Hole, Mass., but occasionally several years will pass without the capture of a single specimen. The present season has been unusual in the appearance of large numbers of adults at Gravesend Bay; as many as seventy-five or eighty being taken at a single haul of a pound net.

The filefish reaches a maximum length of two feet, but the largest taken in this region measured about eighteen inches. They present a rather bizarre appearance in the Aquarium, and their peculiar and awkward movements seem to have a greater attraction than usual for our visitors. While the adults live fairly well, considerable difficulty has been experienced in handling the young, and it has not been possible to keep them more than a few months. Probably the difficulty lies with the character of the food, although the diet has been varied as much as possible in the attempt to rear them to maturity.

The filefishes have no economic importance for the scanty flesh is bitter and offensive to the taste, and it is not improbable that it is impregnated with a poisonous alkaloid. Such poisons are known to exist in the nearly related trigger-fishes, some of which are so noxious as to cause a severe disease, ciguatera, which not infrequently results fatally both to man and lower animals.



COMMON SEA CATFISH

AQUARIUM NOTES

Tarpon.—A splendid mounted specimen of the tarpon has been presented to the Aquarium by Mr. H. Casimir de Rham, Member of the Board of Managers of the New York Zoological Society. The fish, which weighed one hundred and sixty-five pounds, was taken by Mr. de Rham with rod and line at Bahia Honda, Florida.

Aiding Investigators.—During the past year the Aquarium has been able to aid biological research in a number of ways. Owing to lack of laboratory space and proper equipment but little such work can be carried on within the walls of the Aquarium building. Mr. George G. Scott of the College of the City of New York, however, has pursued certain investigations on the blood of fishes in an improvised laboratory.

Dr. Jacques Loeb, of Rockefeller Institute, has been supplied with large numbers of killiefishes for use in the investigation of certain biological problems. Prof. C. F. W. McClure, of Princeton University, has been furnished with the eggs and embryos of salmonoid fishes for the completion of studies on the origin and development of the lymphatic vessels.



RED HIND

Dr. G. A. MacCallum, of New York City, has been for some months examining the diseased and dead fishes for the purpose of determining the nature of fish diseases and the cause of death, and especially to study the parasites of the fishes in the Aquarium.

Porpoises and Dolphins.—Numerous attempts have been made to secure these small toothed-whales in good condition for exhibition at the Aquarium. On several occasions specimens of both have been taken in local waters and placed in the large center pool, but they have always appeared to be injured before their arrival and never have lived more than a week or so.

The last such attempt was made a short time ago when a specimen of the common dolphin was captured in a pound-net at Holly Beach, N. J., and brought to the Aquarium on September 11th. It was evidently nearly dead on arrival, but it survived for two days.

On two occasions we have tried to secure specimens of the porpoise through the cooperation of the porpoise fishery at Cape Hatteras, N. C., the only such fishery on our coast. The first time none were secured. Last winter a second attempt was made and several fine specimens were captured and shipped. The worst blizzard of the season was then raging on the coast and transportation was delayed at a time when it was impossible to protect the animals

properly. The result was that all were chilled and none of them reached New York alive.

It would seem that the Fates have decreed against us in regard to these animals. However, not being predestinationists in this respect, we have decided to renew our efforts and another trial to obtain porpoises from Hatteras will probably be made during the coming fall or winter, in the hope that persistence may be crowned with success.

Stored Sea-Water Analysis.—There is in the storage reservoir at the Aquarium a supply of water varying from sixty thousand to seventy thousand gallons brought in from the open sea for the benefit of our tropical fishes, since these forms, as a rule, do not live well in the brackish and filthy harbor water. The reservoir was filled in July, 1908, and since that time the water has not been entirely renewed, although twenty thousand to twenty-five thousand gallons are added yearly to make up for losses due to waste. It is a fact forcibly impressed upon the management of the Aquarium that corrosion is constantly taking place in the lead-lined and galvanized piping and the bronze pumps through which this sea-water is circulated. Fearing that there might have been an accumulation of lead, zinc or copper salts in solution to a degree that would be poisonous to the fishes, it was determined to have the water analyzed.



COWFISI

The vertical fins often assume very unusual positions in sculling slowly about the aquarium tank.

Dr. Otto Kress, of the Department of Chemistry of Columbia University, undertook the analysis, and his results showed that in spite of the corrosion there has been no increase in such poisonous salts in the water. There is thus no reason to fear that the very considerable chemical action of the warm sea-water upon our piping

and pumps can prove a source of danger to the

fishes.

The thanks of the New York Zoological Society are due Dr. Kress for his kindness in making the analysis.

The Large Turtles.— Both the green and loggerhead turtles live well in captivity, no matter what their age, provided, of course, that they have sustained no injuries in capture or during transportation.

There are at present twelve green turtles of various sizes in the New York Aquarium. The smallest weighs not more than ten pounds, the largest about four hundred. One specimen from the South Pacific Ocean was brought around Cape Horn in a sailing vessel and presented to the Aquarium in 1898. It is in excellent condition after four teen years of confinement.

One loggerhead was received on August 29, 1900,

and is still on exhibition: This specimen weighs about four hundred and fifty pounds, the largest loggerhead ever seen at the Aquarium. Several others weigh in the neighborhood of two hundred pounds, and the smallest one weighs about fifty.

The smaller hawk's-bills live well, but larger ones, seventy-five to one hundred pounds, appear to be unable to adapt themselves to the conditions of life in captivity and can seldom be induced to take food.

Leatherbacks have been tried on several occasions, but the attempt to keep them has always resulted in failure. They swim continually, will take no food and soon weaken and die. Possibly very young individuals might give different results, but these we have not been able to obtain.

All the larger turtles are kept in the harbor water, though in nature they live in the purest sea-water of the open ocean.

Other Aquariums.—American cities have been slow to perceive the importance of the public aquarium as a means of entertainment and



TRUNKFISHES

The humpbacked Buffalo Trunkfish, the common Trunkfish and the horned Cowfish are all represented in the same tank.



TRUNKFISH

The body is encased in an armor of bony plates.

and instruction, but recently the idea seems to have taken hold in a number of centers. For many years New York City stood alone in this respect among the cities of the United States, although its aquarium has continually demonstrated the great popularity of such institutions from its opening day in December, 1896.

The Detroit Aquarium was opened to the public in 1904, and although it is rather inaccessibly situated on Belle Isle, several miles from the city, the attendance for the past year exceeded the million mark. This aquarium, located nearly eight hundred miles from the sea, nevertheless maintains a fine collection of marine fishes by means of a storage system and has thoroughly demonstrated the practicability of the inland salt-water exhibition.

In Philadelphia a temporary aquarium was opened in Fairmount Park on November 25th, 1911, in one of the old water-works buildings. Although possessing but nineteen tanks, in which only fresh-water fishes are exhibited, this aquarium has thoroughly justified its existence, and in the ten months from the time of its opening to October 1st, 1912, two hundred and sixty-six thousand three hundred and thirty-eight visitors viewed the exhibitions. A salt-water aquarium one hundred feet by fifty feet is in process of

construction, with provision for thirty tanks, and will be occupied before the end of the year. Mr. W. E. Meehan, formerly State Commissioner of Fisheries of Pennsylvania, is the superintendent.

At Boston a new city aquarium has just been completed and will be opened to the public within a few weeks. Provision has been made for both salt and fresh-water exhibitions. Mr. L. L. Mowbray, formerly in charge of the Bermuda Aquarium, has been made superintendent of the Boston Aquarium, and Mr. A. O. Featherstone, for more than eleven years an employee of the New York Aquarium, has accepted an advanced position in the Boston institution.

Key West Fishes.—An unusually fine lot of fishes arrived at the Aquarium on October 9th from Key West. Altogether there were three hundred and fourteen specimens of fishes, representing forty-three species, besides conches and starfish. The following list will show the great variety of forms represented in the collection: Nassau, red, yellow-fin and black groupers; mutton-fish; snook; margate; black, blue and queen angel-fishes; spadefish; spot and gray



SPADEFISHES IN THE NEW YORK AQUARIUM
These cross-barred beauties are graceful swimmers.

snappers; common and salmon rockfish; common and buffalo trunkfish; cowfish; butterfly-fish; rock and red hinds; trigger-fish; porgy; white, gray, yellow and blue-striped grunts; squirrel-fish; schoolmaster; rainbow parrot-fish; red and Spanish hogfishes; porkfish; brown and green morays; filefish; yellowtail; Bermuda chub; scorpion-fish; surgeon-fish; remora or sharksucker; southern puffer or swellfish, and sea catfish.

All of these except the buffalo trunkfish and the queen angel-fish have been exhibited before in the Aquarium. Some of these will eventually be placed in the new Boston Aquarium, when the salt-water tanks there are completed. In the meantime, they are all being cared for in the New York Aquarium and a large proportion will remain on exhibition here. The collection was made and cared for during transportation by Mr. L. L. Mowbray, Superintendent of the Boston Aquarium.

Bulletin No. 6.—Wanted, one copy.

The Giant Salamander.—After the lapse of several years, the largest species of amphibian known to the modern world is again represented in the collections of the New York Aquarium. The species, Megalobatrachus japonicus, is a native of Japan, and is a veritable giant among recent amphibians, reaching a length of about three feet.

Some of the early ancestors of the group were as large as alligators, but with the exception of this one all the modern species are small, most of them reaching a length of only a few inches.

Aside from the mere fact of size, the species is interesting to the student of geographical distribution because its only near relative is the common hellbender (Cryptobranchus allegheniensis) of the Ohio River drainage. Evidently these two species are the last representatives of a group which once had a world-wide distribution.

The specimen at present in the Aquarium is about two feet long. The giant salamander lives well and has even been known to breed in captivity.

GENERAL INFORMATION

MEMBERSHIP IN THE ZOOLOGICAL SOCIETY

Membership in the Zoological Society is open to all interested in the objects of the organi-

zation, who desire to contribute toward its support.

The cost of Annual Membership is \$10 per year, which entitles the holder to admission to the Zoological Park on all pay days, when he may see the collections to the best advantage. Members are entitled to the Annual Reports, bi-monthly Bulletins, Zoologica, privileges of the Administration Building, all lectures and special exhibitions, and ten complimentary tickets to the Zoological Park for distribution.

Any Annual Member may become a Life Member by the payment of \$200. A subscriber of \$1,000 becomes a Patron; \$2,500, an Associate Founder; \$5,000, a Founder; \$10,000, a

Founder in Perpetuity, and \$25,000, a Benefactor.

Applications for membership may be handed to the Chief Clerk, in the Zoological Park, Dr. C. H. Townsend, N. Y. Aquarium, Battery Park, New York City, or forwarded to the General Secretary, No. 11 Wall Street, New York City.

ZOOLOGICAL PARK

The Zoological Park is open every day in the year, free, except Monday and Thursday of each week, when admission is charged. Should either of these days fall on a holiday no admission fee is charged. From May 1 to November 1, the opening and closing hours are from 9 o'clock A. M. until one-half hour before sunset. From November 1 to May 1, the opening and closing hours are from 10 o'clock A. M. until one-half hour before sunset.

NEW YORK AQUARIUM

The Aquarium is open every day in the year: April 15 to October 15, from 9 o'clock A. M. to 5 o'clock P. M.; October 16 to April 14, from 10 o'clock A. M. to 4 o'clock P. M. No admission is charged.

PUBLICATIONS

The publications of the Society are for sale at the prices affixed below. Address H. R. Mitchell, Chief Clerk, New York Zoological Park.

First	Annual	Report		Paper	\$.40	The Origin and Relationship of the
Second	44	"·····I	Paper \$.7	5 Cloth	1.00	Large Mammals of North America
Third	,65	**	.4		.00	(Grant) Cloth \$.75
Fourth	46		4) "	.60	Zoologica Vol. I. Nos. 1-7 inc. (Beebe), the Set 1.30
Fifth	44		" .7		1.00	Zoologica Vol. I. No. 8. The Northern
Sixth	16	* 44 /	7		1.00	Elephant Seal (Townsend)
Seventh	44		" 1.0		1.25	Zoologica Vol. I. No. 9. Diseases of Pri-
Eighth			" 1.0		1.25	mates (Blair)
			" 1.2		1.50	Zoologica Vol. I. No. 10. New Blood
Ninth					1.50	Pheasants (Beebe)
Tenth			" 1.2	,		Zoologica Vol. I. No. 11. Feeding Habits
Elevent	1		1.0		1.25	of Serpents (Ditmars)In Preparation
Twelfth			1.0		1.25	The Cultivation of Fishes in Ponds
Thirteen	ith "	46	" 1.0		1.25	(Townsend)
Fourtee	nth "	"	. " 1.0		1.25	Chameleons of the Sea (Instantaneous
Fifteen	.h "	46	" 1.0	0. "	1.25	Color Changes in Fishes) (Townsend) .15
Sixteent	h "	66	" 1.0	0 "	1.25	Sea-Shore Life (Mayer) Cloth 1.20
Notes	on Mon	ntain Sheep	of Nort	h		Guide Book: New York Zoological Park .95
		naday)			.10	(Hornaday) By Mail .35
						The National Collection of Heads and
Destruction of Our Birds and Mammals					.15	Horns (Hornaday). Large quarto.
(Hornaday)				•		Parts 1 and 2
The Ca	ribou (G	rant)			.40	Bulletin Nos. 1 and 6Out of Print
66	"	**		. Cloth	.60	Bulletins—bi-monthlyYearly by Mail 1.00

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Publications and Post Cards of the Aquarium may be obtained by writing Dr. C. H. Townsend, Director, Battery Park, New York City.









